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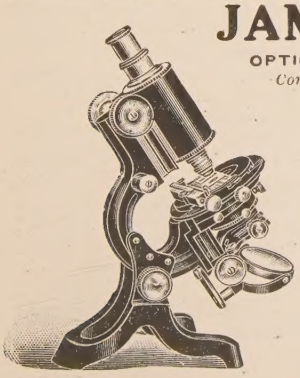

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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 6.] 1915. [No. 9.

APPLIED HYGIENE IN THE TROPICS.

By Colonel W. G. King, C.I.E., I.M.S. (Retired).

REPORTS.

Jail Administration in India.

The following information on matters affecting the health of convicts is obtained from the Reports on Jail Administration of the various Provinces in India, during 1914 :—

Bihar and Orissa (Inspector General of Prisons, Lt.-Col. B. J. Singh, I.M.S.).—

The daily average convict population was 7,007. The average daily sick rate was 28·8 per mille, the death-rate 16·9 per mille, the lowest rate of the previous four years.

"Of the 16,572 convicts discharged during the year from the Central and District Jails, 9,437 or 56·95 per cent. gained weight, against 55·01 per cent. in 1913; 3,102 or 18·71 per cent. lost weight against 20·15 per cent. in 1913, and 4,033 or 24·34 per cent. neither gained nor lost weight against 24·84 per cent. in 1913."

Malarial fevers formed the chief cause of admissions to hospital, 960 cases with but two deaths, or at the rate of 0·3 per mille of the population; the highest death-rate (3·5 per mille) was caused by lung tubercle, the next by dysentery (2·7 per mille). With the exception of four jails, quinine was issued in all as a prophylactic during the rainy season. The general weekly dose was 10 grains. All usual anti-malarial measures, including oiling, were carried out in all jails. Separate accommodation for tuberculosis patients existed at only five jails; but a special hospital for such patients is being erected at Gaya, and proposals for separate wards in other jails are being formulated.

Boys under 15 years of age whose sentences are below three months are sent to a Reformatory School at Hazarobagh, but all under 20 years of age whose sentences are above that period were, during 1914, sent to a juvenile jail, the institution of which was advised by Lt.-Col. Singh in 1913. This is conducted solely upon the Borstal system. The results secured during the year are thus summarized :—

"Two hundred and twenty-one of the boys admitted were discharged during the year, and 142 remained in confinement when the year closed. Very fair progress was made during the year in connection with the general education and industrial training of the inmates. A number of them

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became proficient in reading and writing Hindi, Urdu and Oriya, and in elementary arithmetic, while over 30 per cent. acquired a good practical knowledge of drill and gymnastics."

Burma. (Inspector General of Prisons, Lt.-Col. BELL, C.I.E.).—The daily average number of prisoners was 16,652. The daily average number of sick was 14·89 per mille, and the death-rate 17·66 per mille. Admissions for malarial fevers were 22·2; for dysentery, 16·23; pneumonia, 4·97; diarrhoea, 7·38 per mille. Tuberculosis yielded the heavy death-rate of 4·58 per mille. In one jail, special accommodation for cases of this disease is under construction.

Quinine was issued as a prophylactic "in nearly all the jails in the Province." The rate for pneumonia was much above the average owing to admissions from one jail. The Superintendent of the jail concerned regards pneumonia as "endemic" in the jail, and assigns as exciting causes exposure to dust in wheat grinding by hand mills—a form of penal labour largely enforced in other jails in the Province—chills after such labour, and occasional septic mouths.

In six jails, in addition to rice diet (unpolished), beans were the only form of pulse used throughout the year; in the others from time to time various lentils, meat or fish was substituted.

In the Rangoon jail, where a few cases of scurvy appeared in 1912, there is now issued a ration of uncooked lettuce. There were however four cases during 1914.

In all jails, of the number discharged during the year (25,166) 55 per cent. gained weight, and 19 per cent. lost weight, whilst 25 per cent. neither lost nor gained.

Offenders below the age of 15 years were confined in a Reformatory School. A juvenile jail at Meiktila is reported to have done good work in training boys to handicrafts. When conduct has been satisfactory, sets of tools are given on discharge. "In addition to trade taught, every prisoner had one hour's physical drill and two hours schooling a day."

In all the large jails in Burma cooking is carried out by the employment of steam. Some years back this was further utilized for disinfection. All clothing of new admissions is disinfected before storage, and all clothing and bedding of cases of dysentery and diarrhoea, tuberculosis and infective diseases in jail are likewise treated. During 1914, Thresh's disinfectors have been supplied to five more jails. In one case there is in employment, experimentally, a steam chamber for sterilising plates in the kitchen.

A special ward and enclosure for cases of tuberculosis is in process of erection in Mingyian.

Bombay. (Inspector General of Prisons, Lt.-Col. JACKSON, I.M.S.).—The daily average population of prisoners during 1914 was 11,361. The daily average number of sick was 272·8; the death rate 18·2 per mille. The death rate exceeded that of the previous year (15·6) consequent upon deaths from gunshot wounds in the Belgaum Jail. Mumps was prevalent, three jails between them reporting 453 cases. The Inspector General makes the following remarks on the subject:—"The disease may be spread by a carrier; it was mild in type. I believe myself that the regular use of antiseptic mouth washes by all the inmates of a prison is of considerable use in getting rid of the disease though some medical officers do not concur."

Of the prisoners discharged during the year (20,427) 55 per cent. gained weight, 23 per cent. lost, and the rest neither gained nor lost weight.

The diet hitherto employed presented to the convict much the character of a lottery, in that the same weight of wheat, jowari (*Soorghum vulgare*), nagli or ragi (*Eleusine coracana*), bajri or cumbu (*Penicillaria spicata*) was given.* But, under a recent order of the Bombay Government, the convict will not often, so far as diet is concerned, have reason to regret leaving his hut to be the Inspector General's guest at public expense. That officer states the following changes have been ordered by the Bombay Government :—

"(1) Issue of wheat and rice in lieu of bájri and jowári.

"(2) Issue of 2 ounces of extra flour and one ounce of molasses to working prisoners in the Deccan gang.

"(3) Issue of wheat in lieu of bájri and jowári at the Sind Gang.

"(4) Issue of extra rations to weakly prisoners and convalescents.

"(5) Issue of quinine as a prophylactic.

"(6) Issue of potatoes and onions in lieu of green vegetables.

"(7) Issue of extra warm clothing when considered necessary.

"(8) Inoculation by Professor Haffkine's prophylactic serum."

Punjab. (Inspector General of Prisons, Lt.-Col. G. W. Braide, I.M.S.).—

The daily average prison population was 14,982, the Hospital admission rate 613, the daily average number of sick 33, and the death-rate 25·49 per mille. The mortality rate is in strong contrast with that of 1913, when it amounted to 16·40. This unfortunate result was chiefly contributed to by three jails, one of which returned a death-rate of 55·80 against 18·13 in the previous year. This affords an acute instance of results of change of methods of sanitary care and discipline, which the Jail Department throughout India has had to contend with, following removal of officers of the Indian Medical Service long trained to charge of jails, owing to war exigencies. Their successors have had before them the difficult task of performing technical duties that are only to be acquired by practical experience.

The admission rate for malarial fever was 104 per mille, and the death-rate 0·22. This the Inspector General considers satisfactory, seeing that, although the average daily population was in round numbers only 15,000, the population passed through the jails was 32,650. He ascribes this result largely to the use of quinine as a prophylactic, given during the autumn in 15 grain doses once weekly.

The Punjab jails have for a long period returned a high rate of mortality for tuberculosis ; in 1914 this amounted to 7·4 per mille. Selected Sub-Assistant Surgeons have now been specially trained, and have been attached to each Central jail, so as to secure early recognition and segregation of cases. Major E. L. Ward, I.M.S., Superintendent of the Lahore Central Jail, thus refers to action taken :—

"All suspicious cases are now dealt with systematically. Isolation, examination of sputum, and disinfection of clothing ; also of barracks and worksheds from which suspicious cases are received. These measures have, in my opinion, helped to lessen the incidence of the disease. The Nascent Iodine treatment has recently been tried with a good measure of success in our Tubercle Ward. Roughly, the treatment depends on the liberation of free iodine from iodide of potassium, in the blood, by the action of chlorine. In glandular cases it has been particularly successful."

*[See this *Bulletin* (Sanitation Number), Vol. 6, No. 5, p. 274.]

For juveniles, a Reformatory School and Juvenile Jail is in operation, and the Punjab Government, in reviewing the Report, states that "as soon as the Province regains its full staff of expert Superintendents, the Lt. Governor hopes that it will be possible to organise further progress on the lines [Borstal system] that have led to such good results in England and elsewhere." The Inspector General gives the following opinion as to the applicability of this system to the Punjab :—

"We may not in India be able to achieve the brilliant results obtained in England by this special treatment of the young criminal; but there can be no doubt, whatsoever, that the Indian prisoner has responded to it in a remarkable way, and as our methods improve, so will he."

The United Provinces. (Inspector General the Hon. Lt.-Col. C. MacTaggart, C.I.E.).—

The daily average population was 24,911, being 14·1 per cent. greater than in the previous year. The increase, the Inspector General suggests, was due to the incentive to crime of famine prices of food grains, during a portion of the year. When to this fact is added the disturbance of staff consequent upon war demands, there is room for coinciding with his opinion that a mortality rate of 11·9 per mille against 11·5 in 1913 was satisfactory.

There were 34 admissions for cholera in the jails. In the Bareilly Central Prison, where 25 of the total cases occurred, the infection is held to have been fly-borne from a neighbouring infected village.

A system of prison administration which permits of the small mortality stated is not likely to have much wrong with its ration allowance. Nor when tested by hard labour is the evidence of the weightments against its suitability; as, in this case, it is recorded that "of the prisoners discharged from the jails during the past year 64·9 per cent. gained weight, 9·7 per cent. lost weight, and 25·4 per cent. neither gained nor lost weight. There is practically no difference in these figures from year to year." At page 40 the Inspector General not only details the diet in use but shows how he adjusts its nutritive value in reference to the constituents of the various grains available, to absence of which precaution allusion is made in the preceding notice of the Bombay Jail Report. The method pursued in the jails of the United Provinces may be useful elsewhere, and is reproduced in Notes under Food.

Tuberculosis in South Africa.

The condition of mine workers in respect to pneumonia and tuberculosis in South Africa and the possibility of spread hence to other communities, have attracted attention for some time. The Government of the Union of South Africa appointed a Commission in 1912 to ascertain and advise as to the facts. The results of this enquiry are now available in the form of a Parliamentary Blue Book.* The Commission record no claim to original research work, in the absence of facilities in staff and laboratory organisation. They make the reasonable assumption that the difference of locale is unlikely to disturb

*Union of South Africa. Report of the Tuberculosis Commission, 1914. Cape Town: Cape Times, Ltd., Govt. Printers.

to any important extent the opinions arrived at by the Royal Commission on Tuberculosis of Great Britain. This being so, they have sought largely by means of statistics and evidence of witnesses examined by them to establish the history of origin, nature and extent of tuberculosis infection in men and cattle in communities, and to trace the connection with environment and occupations.

In the matter of statistical evidence, the Commission were naturally handicapped, as a result of defective registration. The chief historical reliance has therefore been based upon the records of early times, and of present day witnesses. In this way, they arrive at the opinion that two generations back there was not a great deal of tuberculosis in South Africa, and that such as existed as to both blacks and whites was confined to coastal communities, in close connection with Europeans. From this, they naturally proceed to discuss the influence of immigration by infected Europeans. They show that possible foci have been largely added to by such immigration. The following table, compiled from a portion of the text of the evidence as to origin of disease in Europeans where the history of origin was traced, will convey an impression on this point; it shows the deaths of Europeans from tuberculosis :—

Period.	Locality.	Imported.	Indigenous.	Total number of unknown origin.
Six years ending 30th June, 1913	Johannesburg	274	178	349
1908–1912 ..	Bloemfontein	43	25	68
	Cape Govt. *Railways*			
	Bulawayo	9		9
	East London	15	13	36
	Naauport	9	1	10
	Beaufort West	2	7	10

Of 202 Europeans dying in Cape Town in the years 1906 and 1907, whilst the origin of the disease was not verified, it is stated that 20 per cent. had been in South Africa less than one year.

The Commission hold that there is evidence that the aggregation of consumptives in certain Karoo villages has "formed foci from which the disease has spread, and that, in this connection, the influence of the length of time where mail communication has been available is distinctly traceable."

From statistics covering the period 1904–11, it is concluded that in Cape Province, amongst Europeans in urban areas, the average deaths from tuberculosis amount to 9·67 per cent. of all causes. In the case of "other than Europeans," the rates are 17·81 and 13·43 respectively. In the Transvaal, the rates for Europeans are 8·4 for urban and 2·9 for rural areas, and for other than Europeans the corresponding rates are 14·3 and 9·4 respectively. In the Orange Free State, registration of deaths of Europeans only is carried out, and this seems to be still imperfectly conducted.

"The average percentage in all causes of deaths from tuberculosis between 1904 and 1911 was 7·4. In the Transvaal, the statistics are particularly unreliable for rural areas, but are fairly correct for urban areas. In interpreting them, it must be remembered that the mining industry and the accompanying prevalence of pneumonia and tuberculosis are to be found and yet thus the whole truth cannot be demonstrated, as the natives form a fluctuating population, they being largely recruited from distant areas." "The figures available from 1902–1911 show that tuberculosis was the cause of deaths in Europeans in urban areas to the extent of 8·4 per cent. of all other causes, and that in case of other than Europeans the rate was 14·7 per cent."

The Commission make the following remarks as to classification of tuberculosis in mine workers :—

"As far as the registration of deaths is concerned, it is very doubtful to what extent deaths recorded as miner's phthisis were really due to silicosis and what to tuberculosis. It is not infrequently assumed by the uninformed that any case of tuberculosis which has originated on the mines should be termed miner's phthisis. On the other hand, in the majority of advanced cases of this disease the tubercle bacillus is present in the lungs. On the whole, therefore, we have considered it best to include the deaths returned as miner's phthisis in all of the tables. . . . The actual number of deaths registered from miner's phthisis is not great, as the following figures show."

They arrive at the conclusion that amongst Europeans in the Transvaal tuberculosis "does not prevail to any serious extent except in urban areas, and that it is found chiefly amongst the males associated with mine labour." As to natives, however, their report is as follows :— "So far as the statistics go, they indicate that a very severe mortality both from tuberculosis, from pneumonia, and from all causes is taking place in the urban and especially the mining centres, and that the mortality from tuberculosis is on the increase. Outside of these areas, the death registration affords us no information."

In Natal, again, incomplete statistics rendered the task of the Commission difficult. Natives are excluded, but statistics as to indentured Indians are available. On the subject of mortality of Europeans they are able to express the following opinion :—

"Assuming that registration is complete, and that the numbers of the population to which they are referred are correct, it would seem that the mortality from tuberculosis is comparatively small among Europeans in Natal. Moreover it would appear that the amount is diminishing in the urban areas. The mortality per 100,000, in 1909, was in urban areas: Phthisis 60, other forms 10; in the rural areas: Phthisis 40, other forms 9."

In the population of indentured Indians the tuberculosis death-rate was in 1911, 3·7 and amongst free Indians 2·5 per mille. They hold that tuberculosis "is of very much greater occurrence among indentured than free Indians." In this connection, attention is drawn to the fact that the age constitution of the two populations differs and a table is given distinguishing between persons under and over fifteen years of age. It is then seen that the rate is somewhat in favour of the indentured adults, the apparent increased rate being due to greater incidence of the disease upon children. This the Commission ascribe to Indians engaging their children upon labour, and the consequent undesirable strain upon them diminishing resistance to infection.

The death-rate from all causes amongst Indians compares favourably with that found in many parts of their own country; thus, in the three years ending 1911, the average for those indentured was

12·3, and for the unindentured 23 per mille. In these cases, the checking of tuberculosis is largely connected with improvement in dwellings and general sanitary conditions.

Were special measures against tuberculosis amongst Indians taken, an important step towards a decreased death-rate would at once result, but there would remain to be considered a special liability to death by pneumonia (2·5 per mille) as well as "deaths of women in the puerperal state and from suicide and violence." More care in selection at recruiting depots in India would also seem essential; as ·37 per mille were affected with tuberculosis on arrival in South Africa and, according to Dr. Nicol BURTON, 800 to 900 per mille suffer from ankylostomiasis [p. 93].

In discussing the existence of infection amongst natives of South Africa, the Commission state that the problem of prevention is not so simple as in the case of Indians. The Commission represent the average life to be one of freedom and of simple habits combined with considerable laziness, when compared with the average strenuous life of more civilised races.

"Mere removal from these conditions acts indirectly upon general health. The tendency is towards increased civilisation and in reaching this goal the route is obvious. Thus for the simple blanket, put off as he feels hot or cold, the native is fast substituting second-hand European clothing, often of far too thick a texture for the African climate during the day, and this wet with perspiration, and unremoved at night fall, subjects him to chill. His hut is devoid of ventilation, and he sleeps with his head covered by a blanket or other covering devoid of cleanliness. In ordinary body cleanliness he is described as fairly clean, but he possesses one bad and invincible habit, that of incessant spitting promiscuously about, which is important from the point of view of tuberculosis. The diet consists largely of maize with irregular supplies of vegetables and very occasional meat. He drinks "Kaffir beer" of but small alcoholic strength; now there is a popular belief that this possesses antiscorbutic properties. In advanced areas, he has an undesirable penchant for beer of foreign make and great alcoholic strength."

This is the African native, who in the midst of the conditions incident to mine labour, where presumably the "invincible habit" of promiscuous spitting is not abandoned, yields largely to pulmonary tuberculosis. On return to his place of origin, the infected native does not seem to have caused rapid increase of tuberculosis amongst those with whom he is brought in contact. He lies largely in the open air and the sputa are more liable to be exposed to sun action, and further the life of the infected is short as the course of the disease in the African race is rapid.

Statistics are quoted as to four important mines in the Rand. The average annual death-rate (presumably in a population of adult males, and subject to quick removal of the unhealthy and substitution by fresh recruits) was between 1903–1912 21·77 per mille; the tuberculosis death-rate was 2·15 and the pneumonia death-rate 14·22. Scurvy is said to be "exceedingly heavy in its incidence."

An important point in an enquiry as to causation of disease incidence necessarily is whether there is any difference between underground and surface workers. This the statistics clearly show, though in other respects the workers live under similar conditions.

They found [p. 158] that "pneumonia is three times as common, and the mortality nearly four times as great in the underground worker as in the surface worker, and the case mortality is half again as great. Also other respiratory diseases are over four times as frequent underground, but as the case mortality is only a quarter of what it is on the surface, the rate of mortality is not greatly increased. Both illness and mortality from other causes are also considerably greater in the underground worker, but as the increase in the number of cases is greater than the increase in the rate of mortality, the average case mortality is not increased."

The recommendations as to mine workers deal with measures calculated to increase resistance to infection by improved arrangements in diminishing working strain, regulation of diet, increase of the small cubic space in dwellings from 200 feet to the still small allowance of 300 feet, the use of portable steam disinfectors for clothing and blankets.

Surgeon-General GORGAS on inspecting these mines some time back placed stress upon the use of "locations" as against barrack life; that is, he estimated that, under a condition where family life was possible, better feeding and better hygienic arrangements generally would supervene, and thus resistance would be raised. His own experience in Panama pointed to this measure being beneficial in decreasing tuberculosis. The Commission however have not acted on this suggestion, under the belief that the rest and change incident to visits at intervals to distant homes was more likely to be beneficial.

On the subject of mine dust, the Commission advise as follows :—

"In view of the particularly harmful effects of air-vitiation and the inhalation of silicous dust in predisposing to tuberculosis and pneumonia, it is essential that every effort be continued, pursuant to the Mining Regulations, to secure adequate air-change underground, and the adoption and enforcement of the methods prescribed from time to time for the prevention and allaying of dust."

Descriptions are given of the dust obtained from these mines. The following is selected as sufficiently characteristic of the others :—

"Sample from the *Dutoitspan Mine*—none of the fragments appear to be much over 0·1 mm. in diameter. The dust is more generally crystalline than the others. Quartz crystals are frequent."

The influence of spread of dust by blasting is thus alluded to :—

"It is now recognised that the chief factor in dust distribution is the effect of blasting operations, and it is not the coarser dust which is so injurious, as the finer particles forming the 'haze' in the mine atmosphere, and it is this which requires a long time to clear."

As to dissemination of infection the Commission remark :—

"It is difficult, if not impossible, to prove definitely that any given condition does actually spread the infection of tuberculosis or pneumonia; but if we admit that these diseases are spread by infection, then . . . among such conditions are :—

"(*a*) The admission of tuberculosis workers into the compounds and mines.

"(*b*) Conditions of the compounds favouring the retention and diffusion of infection when introduced, i.e., bad lighting, inefficient ventilation, uncleanliness.

"(*c*) Overcrowding and other conditions bringing the healthy into contact with infection either already existing free, or being given off by an infective individual."

The Commissioners state :—

"Inhalation of such dust should be capable of producing pulmonary irritation and fibrosis. And short of this it would seem likely that it is a

factor predisposing to pulmonary tuberculosis and pneumonia. There is, however, no record of the occurrence of miner's phthisis among the Kimberley miners."

To this opinion Dr. PORTER adds a dissenting Note :—

"This is an unproven assumption, which may or may not be true in regard to pulmonary irritation and tuberculosis, whilst, as regards fibrosis, it is in direct conflict with lengthy medical experience in Kimberley. Moreover, no information is given as to the comparative *amount* of dust in the air of each mine."

KINGSTON, JAMAICA.

Under the notification system, during 1914, in Kingston the incidence per 1,000 of the population was, of tuberculosis 3·49, enteric fevers 6·34, and of all infectious diseases exclusive of tuberculosis 8·13. The total death-rate from all causes was 26·83 and the birth-rate 36·59 per mille of the population; the infantile death-rate per mille of births was 231.

Dr. Oliver CROSSWELL,* Acting Medical Officer of Health, urges better protection of the river source of water-supply, and the necessity for increased storage as a purification measure. He specially animadverts upon the existence of slum dwellings, urges that the expenditure necessary be made and hopes "to be able to persuade the Mayor and Council to put forth a special effort to clean up these insanitary areas." The heavy incidence of enteric fevers and tuberculosis would certainly show that the Council has before it a task of dealing with diseases that can be successfully prevented.

BASUTOLAND.

The Principal Medical Officer, Basutoland, in his Medical Report for 1914, makes the following remarks as to the prevalence of typhoid. It is not stated what preventive measures have been found feasible, and, having regard to the scattered nature of the communities dealt with, the problem probably presents difficulties :—

"There has been a severe outbreak of enteric fever. Six hundred cases were seen at the dispensaries and 112 were admitted into Hospital, of whom 20 died. Many of the latter were brought long distances, and were in the second week of the disease before admission. The 600 cases seen as outpatients do not represent more than a tithe of the total number of cases in the territory. Reports of severe outbreaks with a higher mortality were received from missionaries, traders, and others."

GUAYAQUIL.

Whilst it is well known that the organisation of the Panama Canal is such that *per se* it offers not a menace to health of communities elsewhere but a model of sanitary effort, there can be no doubt that Guayaquil is a possible source of explosive epidemics of plague, yellow fever or small-pox. This fact in part has necessitated some diplomatic pressure from the U.S. Government, which is apparently now bearing fruit. According to a Report by Dr. BECERRA, Director of the Public Health Department, for 1914, the radical improvement of introducing a sound water supply is already in progress under the British firm of J. G. White & Co., Ltd.

*M.S. Report on the Sanitary Condition of the City and Parish of Kingston for the year 1914–15.

As to plague, 443 cases were admitted to Hospital treatment. The mortality is stated to have been only 35·66 per cent. against, among 779 cases in 1913, 39·27 per cent. Both results are of a record nature. They are still more so when viewed by the following remarks by Dr. PEREJA :—

"Of Bubonic Plague 443 cases have been attended to of which 158 were fatal giving a death-rate in full of 35 per cent. but, as I have already expressed on another occasion, many of the fatal cases in our Pest-house were received in such an advanced stage of the disease that it was impossible to apply any effective treatment with good results. Therefore if we consider in the percentage noted those cases that have remained in the Pest-house over 24 hours and in consequence were enabled to get the benefit of the treatment by serum, we will have out of 328 cases treated 83 deaths which gives us a twenty-five per cent. death-rate ; a percentage much lower than the one of past years in so far as regards the death-rate. The number of cases treated also shows a progressive reduction in the disease as is proved by the important reduction of 331 cases in favour of the year just passed."*

Unfortunately Dr. PEREJA does not state what particular "serum" was employed by him in these cases. Under any method of treatment hitherto employed such results are unusual.†

Whilst in 1913 there were 342 yellow fever cases, in 1914 there were only 42. This decrease is assigned to systematic attention to a "well determined focus of infection some distance from the centre of the city, and of which the Sanitary Department were at once informed." By tracing such foci and obtaining prompt reports of occurrence, it is hoped the disease will be got rid of.

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*M.S. Report on Bubonic Plague and Yellow Fever at Guayaquil during the year 1914, dated March 15, 1915.

†According to Dr. STRONG and his colleagues, who visited Guayaquil in 1913, the type of plague there is very mild as compared with that seen in the East.

DISEASE PREVENTION.

Malaria.

Mosquito-Eating Fish.

In the Report of the Bureau of Health for the Philippine Islands for 1914, the Director of Health (Dr. Heiser) reports :—

"A supply of fish (*Gambusia affinis*) were obtained from Hawaii and placed in the fish ponds of Tondo, the esteros, fountains, etc. Up to the present time these mosquito-eating fish have proved of very little service because the mud fish, the local name of which is *dalag*, devour the mosquito fish. In fountains and other places where the mosquito fish were unmolested they kept the water free of mosquito larvae. In the opinion of Mr. Seale, the fish expert of the Bureau of Science, the *Gambusia affinis* will gradually establish itself and multiply in spite of its enemies."

The Breeding of "Millions."

The Malaria Board Bureau, Kuala Lumpur, has undertaken experimental breeding of "millions" under various conditions. The following conclusion is arrived at :—

"We will here only draw our conclusions on this point from the culture in the gardens tank. Here the fish were regularly fed, free of natural enemies, and undisturbed for a long period. Yet although we did get thousands where we only placed in tens, nevertheless *millions* were not produced as we had hoped. In fact, in spite of all the varying conditions in which they have been placed, they have not proved prolific breeders so far. It is quite possible that we have an exaggerated idea of their powers in this respect. . . . To summarize, we have very good evidence that we will be able to naturalize this fish and *ipso facto* they will be efficient anti-malarial agents."*

Mosquitoes.

During 1914, Dr. Stanton examined several thousands of mosquitoes, specimens sent to him for this purpose. It was ascertained that the "mosquito fauna of Java, Sumatra and Borneo correspond closely to that of the Malay Peninsula," and that, contrary to usually received opinion, the *maculata* and the *umbrosus* are present in Sumatra. A new species of larvae related to *Anopheles culiciformis* of India was obtained from the water in cut bamboos, but no specimen of the adult insect has so far been taken. A new species of anopheles was recorded from Lampongs, Sumatra, and a new species of Phlebotomus (*P. stantoni* Newstead) from the Federated Malay States.

Mr. C. Strickland, the Travelling Medical Entomologist, in a discussion as to the presence of malaria in reputed healthy localities of Morib states* :—

"We can . . . say, with some certainty that *rossi*, if infected at all, is only so to a much less degree than the others. Further, although *sinensis* has been found to the extent of about 2 per cent. to be infected, yet its presence in great numbers in certain districts without causing any fever is in marked contrast to what we read of the amount of sickness caused by *umbrosus* and *ludlowi* ; it is, therefore, probably less infective than these two species. We have only a little indirect evidence which shows that probably *umbrosus* is not so infective as *ludlowi*."

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*Federated Malay States Medical Report for the year 1914.

He arrives at the following conclusion :—" If we knew the relative infectivity of the various species, then in any situation we could soon find out the relative amount of harm which was doing by taking a mosquito census."

Montserrat.

In his Annual Medical Report for 1914 the Senior Medical Officer (Dr. J. C. McPherson) states :—

"As regards malaria, it has often been reported that no anopheles existed here which might act as a carrier, but specimens of the *Cellia argyrotarsis* have been found at Elberton, and it is interesting to note that 'fever' was said to be at one time very common in this region, possibly of malarial origin."

Antigua.

The area of this island is not great but the anti-malarial measures, as elsewhere, may be classed as major and minor in nature. Dr. W. M. McDonald, the Medical Superintendent, in the Medical Report for 1914, makes the following remarks illustrating the possibility of the utility of Sanitary measures being minimized by absence of attendance to details :—" Mosquitoes have been very prevalent and troublesome. Practically no attempt is made to tackle the mosquito in question. I understand that the large ponds throughout the Island are stocked with " millions," but no attempt is made to get rid of the small ponds and collections of water." It is understood this representation received prompt official attention.

Zanzibar.

The Acting Medical Officer of Health (Dr. Carment), Zanzibar, quotes statistics supplied by Dr. Howard, of the Universities Mission Hospital :—In 324 admissions there were 45 " malarial cases " with enlarged spleens. There were 16 instances of filarial diseases ; in 25 cases micro-filariae were found. Dr. Carment has undertaken still incompleted work as to the degree of prevalence of micro-filaria. His examination so far of the prison population, selected as representative of mixed sexes and tribes, yielded one positive case in 14 examined.

The mosquito brigade of Zanzibar originally organized by Major Skelton, R.A.M.C. continues to do useful work. In the Town District, there has occurred since 1910 a steady decline in the mortality from malarial fevers, as thus shown* :—

Period.	Death from malarial fever.
1910	203
1911	189
1912	171
1913	159
1914	145

*M.S. Report on the Prevention of Mosquito-borne Diseases during the year 1914, dated 4th June, 1915.

KUALA LUMPUR TOWN

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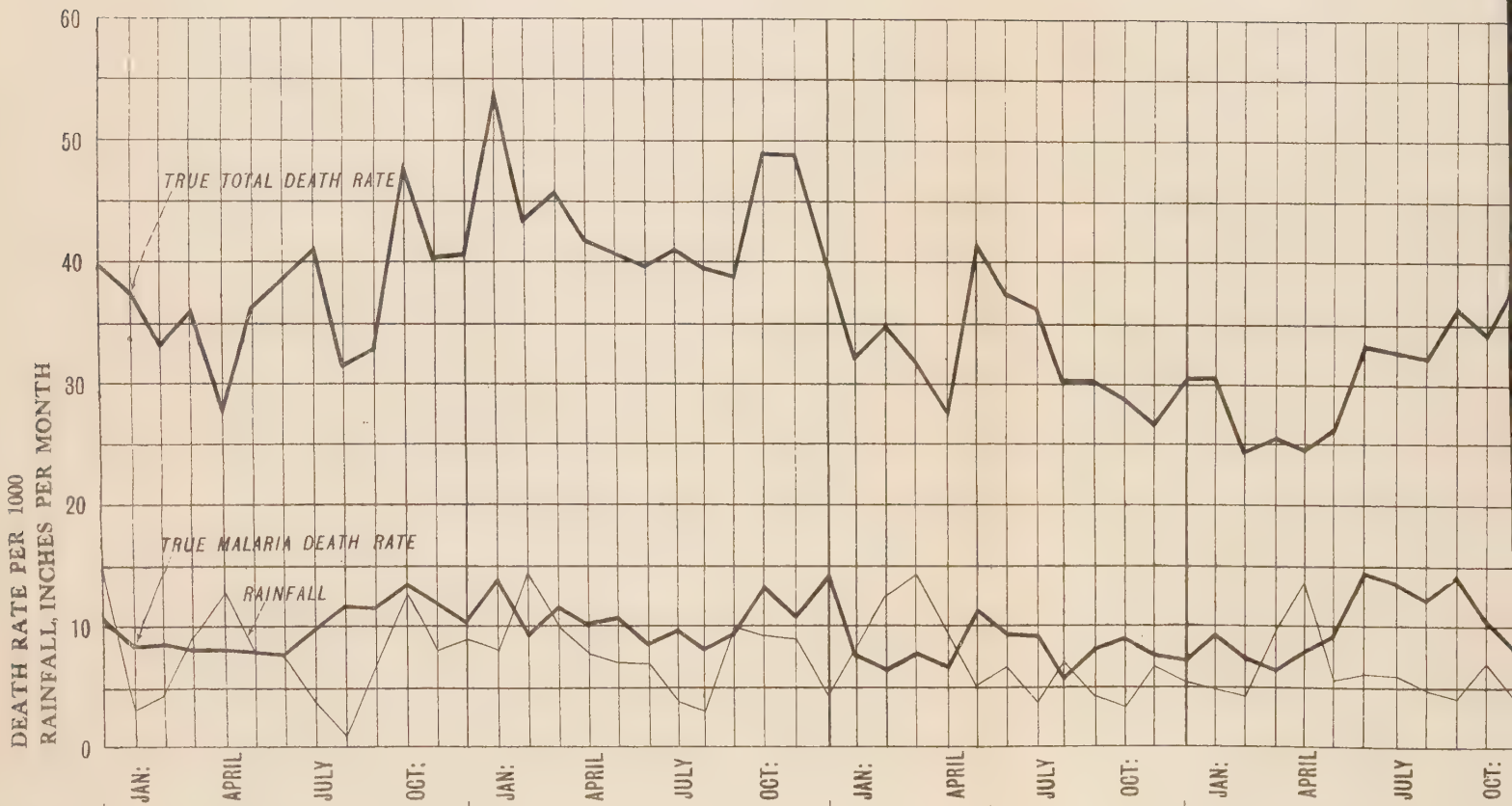
SHOWING TRUE
TRUE MALA
RAINFAL



	1907	1908	1909	1910
Malarial Death Rate for Year	9·7 %	10·7 %	7·7 %	9·8 %

Expenditure on Anti-Malarial Drainage Work.

Construction	1908	to	1911	inclusive
Maintenance		do		do

F. D. EVANS,
EXECUTIVE ENGINEER,
MALARIA ADVISORY BOARD,
F. M. S.

HART
TOTAL DEATH RATE,
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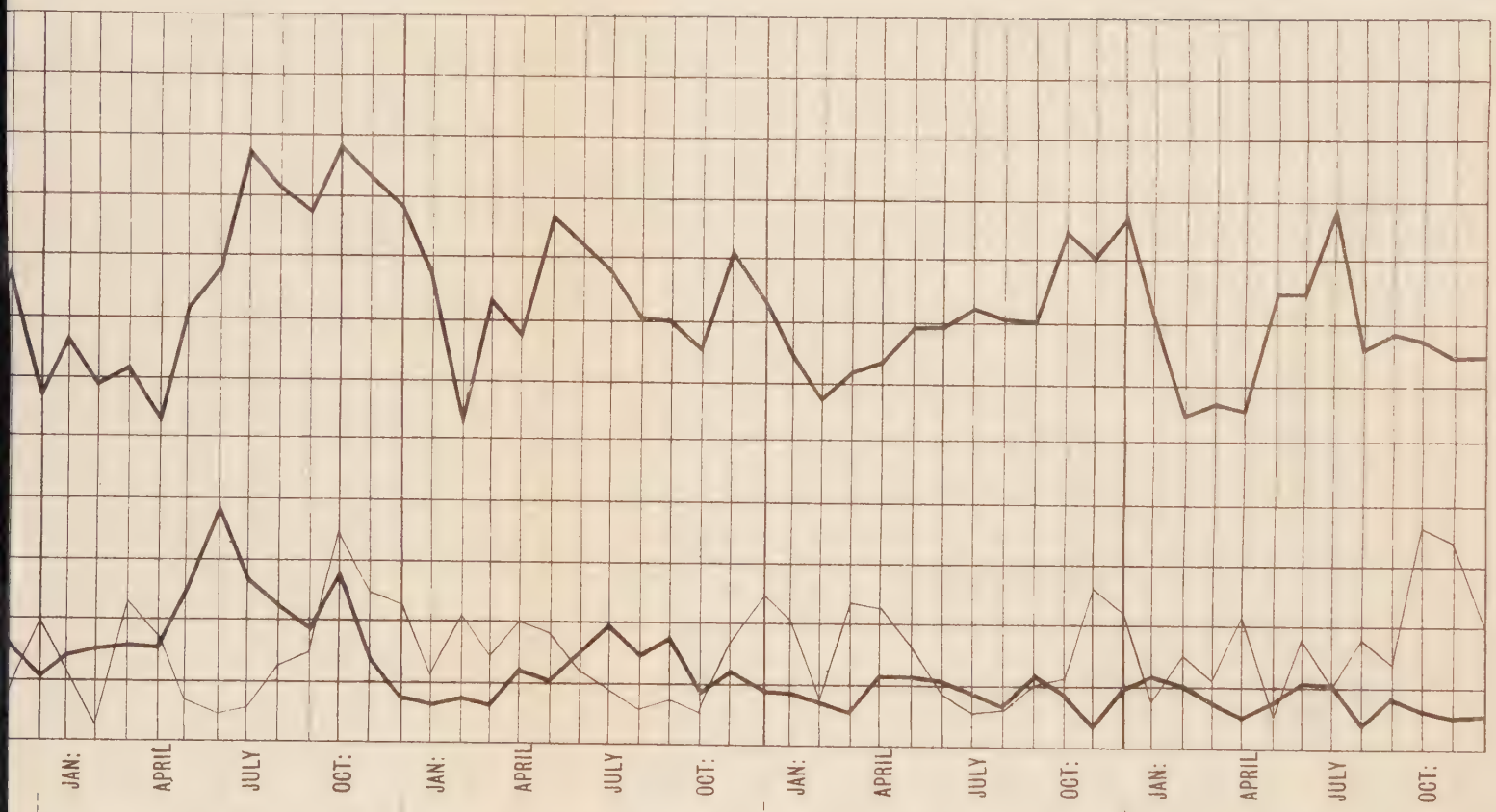

1911	1912	1913	1914
9·9 %	5·8 %	4·2 %	3·9 %
$ 47,705·00	Construction $ 37,526·69	Construction $ 68,459·36	Construction $ 22,314·43
$ 6,986·85	Maintenance $ 5,589·51	Maintenance $ 11,118·07	Maintenance $ 11,156·69

Total expenditure to end of 1914: Construction $ 176,005·48; Maintenance $ 34,851·1

Federated Malay States.

The progress of anti-malarial measures in the Federated Malay States must be of general interest to sanitarians in the tropics, in that there has been here a whole hearted endeavour to use not one recognised method but all or any specially suitable for the locality. The Report of the Malaria Advisory Board shows that in the Kuala Lumpur area the excellent results noted in this *Bulletin* [Sanitation Number, Vol. 5, No. 8, p. 478] continued.

In a census population of 58,107, liable to frequent importation of malaria-bearers from the surrounding population, the percentage due to malaria in deaths from " all causes " in 1911 (by the end of which the drainage construction works had made reasonable advance) was 9·8. In 1912, 1913, 1914 the respective rates were 5·8 per cent., 4·2 and 3·9 per cent.

The amount of decreased sickness from malaria represented by this improvement in the death-rate is doubtless considerable in the town population, but is best illustrated by the condition of recruits at the Police Department. This is not placed in completely favourable conditions up to date, as a swamp in its neighbourhood (Butu Road) had still to be treated. It remains an illustration of the necessity for Local Authorities to secure by suitable legislation control over private property, in the health interests of communities. It is reported, " Government have filled up their portion of the land, but nothing has been done on lot No. II. belonging to a private person." Notwithstanding this still existing danger, the incidence of malaria upon recruits, during residence at the depôt, shows a marked change since the subsoil drainage works were undertaken, as demonstrated by the accompanying chart reproduced from the Report.

As regards expenditure, it is recorded that 1863 feet of sub-soil pipes were laid in Pudu Dam, at a cost of 4,773 dollars.

Small-pox or Varicella.

Dr. John Nivison Force and Helen Lowell Beckwith in a paper entitled " A Laboratory Method for the Diagnosis of Small-pox "* relates the circumstances of a case which is typical of a problem that occasionally presents itself—a quick diagnosis between a mild attack of small-pox and varicella.

" A. M. H., a student, was admitted to the University Infirmary, Jan. 15, 1915, with the following history : During the Christmas vacation he had occupied a bed with his brother at his home in San Diego. Dec. 30, 1914, the brother developed a rash strongly suggestive of small-pox. The brother was isolated and A.M.H. was vaccinated and the health officer finally decided that the brother had chickenpox and A.M.H. was allowed to return to the university. On Jan. 14, 1915, A.M.H. noticed vesicles on his body. January 16, patient showed scattered vesicles over his body characteristic in distribution and general appearance of chickenpox. January 17 the eruption had become more general and several of the lesions had become umbilicated. January 18, edema of the face ; a profuse eruption appeared on the face, body and arms, with many umbilicated pustules and papules on palms and soles. January 19, maximum temperature 39·4 C. (102·9 F.). January 21, pustule contents were collected and a series of vaccine sensitized rabbits was inoculated intradermally. January 22, the patient was photographed. No reaction occurred in any of the series of rabbits.

"Had the student whose case is here described been first seen at the height of the eruption, and had he not been vaccinated successfully a few years previously he would have offered a splendid exercise in clinical differential diagnosis. It is in this class of "border-line" cases that we hope the skin reactions of sensitized rabbits and guinea-pigs will prove a diagnostic aid."

In discussing the subject they refer to the statement by JENNER that, on the application of variolous material to the scarified skin of persons sensitized by previous small-pox or cow-pox," there occurs a reaction now classed under cutaneous allergic phenomena. Tréche in 1912 showed that these reactions were not produced in persons immune to small-pox when varicella material was used, and suggests the use of these reactions in differential diagnosis." The authors' review of TRÉCHE's work brought to their attention the desirability of securing skin reaction on sensitized animals which, being kept in laboratories, would be always available; the expert's knowledge of what constituted a typical reaction would be more decisive than if the subject were left in the hands of the average practitioner. They therefore experimented on applying "vaccine virus, small-pox vesicle contents and varicella contents to the skin of previously vaccinated animals," and ascertained results. They found that the intra-dermal injection of the material to be tested on the sensitized animal gave more results than seeding by scarifications.

"The injection was made with a glass tuberculin syringe provided with a 26 gage needle 10 mm. in length. The amount injected was between 0·05 and 0·1 cc. and if properly placed was felt as a small lump in the skin. The intradermal reaction appears within twenty-four hours after the injection, but may not reach its maximum until the second day. It disappears gradually. It is characterised by an infiltration of the skin at the site of the injection, with redness and often heat. The redness fades before the infiltration disappears."

They believe that as "small-pox vesicle contents preserved their properties as allergous for nine days at ice box temperature, it would seem practicable to collect vesicle contents in capillary tubes at the bed side and ship in vacuum bottles, or other suitable containers, to central laboratories for intra-dermal tests on rabbits sensitized to vaccine."

The authors as a result of several experiments arrived at the following conclusions :—

"1. Rabbits sensitized by vaccination with vaccine virus will give a marked intradermal reaction with smallpox vesicle contents in from twenty-four to forty-eight hours, but will not give such a reaction with varicella vesicle contents.

"2. The cutaneous allergy following the original vaccination was present for at least eight months though there had been no stimulation by the allergen during that period. (Rabbit 8).

"3. The intradermal reaction was produced with smallpox material nine days after removal from the patient.

"4. A laboratory diagnosis of smallpox is, therefore, available to physicians and health officers, since vesicle contents may be shipped in capillary tubes to central laboratories and there used for making intra-dermal tests on sensitized rabbits or guinea-pigs."

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*Journal of the American Medical Association, 1914. August. Vol. 65. No. 7, pp. 590–591.

The Sanitary Care of Lepers.

How far lepers afflicted solely with the anaesthetic form of the disease are a source of danger to a community is still unsettled. In Hawaii* the tendency is to regard such cases as, at least comparatively, so small a danger that, amongst a people where it has not been possible fully to control the tubercular form, it is unnecessarily harsh to insist upon the breaking of family ties. There is however the manifest danger that in the same subject mixed forms of the disease present themselves. It has therefore been decided to allow reasonable liberty to subjects of the anaesthetic form, whilst retaining them under the following rulings :—

"(1) The patient to report to a medical representative of the board of Health for examination at least once in every three months.

"(2) The patient should not be permitted to engage in any occupation that would necessitate his handling or preparing food for other persons.

"(3) The patient should not live in the same house with children (16 years or under).

"(4) The patient should have separate bedding and table utensils."

The role of nasal mucus as a possible source of infection is thus [p. 81] referred to :—

"Two inmates of the settlement have been studied carefully, with a view to determine whether they now have leprosy. After several examinations one was declared clean ; the other persistently showed a very small number of acid-fast bacilli in the nasal mucus, but no lesions were to be found in the nose nor were there any elsewhere. It was recommended that this case be paroled under the observation of the health department, the view being entertained that as this patient was constantly associating with lepers he might readily have a few acid fasts in the nasal cavities without actually being infected, or, indeed, the acid fasts might not be *B. leprae* at all, as it is well known that a small percentage of healthy persons carry acid-fast bacilli in the nasal mucus."

This section of the *Bulletin* is not concerned with treatment, but as emphasizing the importance of improving the condition of lepers by placing them under good sanitary conditions and thus raising resistance to the *B. leprae,* the present day faith in treatment by chaulmoogra oil may be referred to. Surgeon Heiser has carried out experiments by hypodermic injections of this oil. The Report above referred to states [p. 80] "The results have been favourable in a general way, though there seems to be but little reason for expecting a definite cure in any of the cases." This, the writer thinks, is a fair summary as to any method of cure attempted up to date, if the results of Rost's method, of which he has seen much, be excluded from consideration. Rost's method, whatever the different opinion of bacteriologists as to what is and what should be the specific microbe concerned, seems to him to have most favourable influence.

The condition of lepers appears to the writer to depend as much upon hygienic conditions as in the case of tuberculous patients, and it is possible that modified sanatorium treatment of a similar character, so far as hygienic measures are concerned, would be in the right direction.

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*U.S. Public Health Service Annual Report for the year 1914.

In the large Leper Asylum of the City of Madras, gurjun oil was in use by Surgeon-Major THOMSON, C.I.E. as early as 1876, and chaulmoogra oil in 1880 or probably earlier. The writer is not aware that the one oil has a merit the other does not possess. The treatment by gurjun oil however was a favourite method in 1876. It was administered as a lime water emulsion internally and was applied with friction to the body generally. Improvement of cases resulted.

The writer was in charge of a small leper asylum in Trichinopoly, South India, about 1876–77 and here gurjun oil treatment was also in vogue and was attended with some improvement of the subjects. He believed however that there was probably no specific action in the oil, and that improved diet, skin friction and favourable environment were the real factors. He therefore placed patients in groups: (*a*) on gurjun oil treatment, (*b*) on cod-liver oil (internally), (*c*) the syrup of iodide of iron and (*d*) on cream. The group on cream, in testimony apparently of the ready assimilation of fat, yielded decidedly the best results. But in the case of both this group and improved members of the other groups, permission to return to their village homes, on temporary leave, always resulted in an aggravation of symptoms.

TYPHOID AND WATER DISINFECTION.

The following statistics, showing influence on the typhoid fever rate in cities which have adopted the treatment of their water supplies by hypochlorite of lime, are quoted by the "Engineering Record" of June 13th, 1915, p. 674:—

AVERAGE TYPHOID-FEVER DEATH-RATES PER 100,000 PERSONS.

City.	Began using hypo.	Before using. Period.	Before using. Rate.	After using. Period.	After using. Rate.
Baltimore	June, 1911	1900–10	35·2	1912–13	22·8
Cleveland	Sept., 1911	1900–10	35·5	1912–13	10·0
Des Moines	Dec., 1910	1905–10	22·7	1911–13	13·4
Erie	March, 1911	1900–10	38·7	1912–13	13·5
Evanston	Dec., 1911	1907–10	26·0	1912–13	14·5
Jersey City	Sept., 1908	1900–07	18·7	1909–13	9·3
Kansas City	Jan., 1911	1900–10	42·5	1911–13	20·0
Omaha	May, 1910	1900–09	22·5	1911–13	11·8

TYPHOID IN SYDNEY.

Dr. J. S. PURDY, in his Report on the combined Sanitary District, Sydney,* thus enforces the advantage of the water carriage system of sewerage:—

"The extension of the water-carriage system of sewage removal is the measure in a large city which gives the most striking evidence as being responsible for the reduction of the incidence of typhoid fever. . . . No other sanitary work gives a more immediate and better return for expenditure."

At the end of 1913, 115,601 houses were connected with the sewers.

The death-rate from typhoid is now one-sixth of what obtained in Sydney forty years ago. Per 100,000 the typhoid death-rate decreased as follows:—

1885–1890	51·3
1891–1900	21·6
1901–1910	13·2

*New South Wales. Report of the Director General of Public Health, 1913, p. 81.

Ankylostomiasis.

Dr. Hart* finds that in patients admitted in Kuala Pilah Hospital the extent of ankylostomiasis according to race was per cent. for Malays, 50 ; Tamils, 30 ; and Chinese, 25.

In connection with the rate found in Tamils, it may be stated that Surgeon-Captain Williams, I.M.S. (about 1894) at a time when the presence of this parasite received but little attention found that, in 26 post-mortems at the Madras General Hospital, the percentage of ankylostome bearers was 52.

Disinfection of Railway Carriages.

On a route much used by tuberculous patients the following is the method of disinfection of carriages employed. The carriage concerned is removed to a siding reserved exclusively for disinfection work.

"The ventilators and windows of the car are tightly closed, the berths are taken down, the blankets, pillows, and mattresses are spread out so that the formaldehyde gas which is used may have access to the contents of the car. Three galvanized-iron pails are then placed on the floor of each car, one at each end and one in the center of the car. In each pail are placed 500 cc. of commercial formalin and 250 grams of potassium permanganate, and the doors of the cars are tightly closed. The car remains closed for about 12 hours. The windows and doors are then opened to air the car and to free it from gas, after which all carpets, upholstered seats and backs, blankets and pillows are removed from the car and placed on the platform exposed to the air and sunshine.

Dust is removed from the removable seats, backs, and carpets by means of compressed air, the force of which is so great that it removes practically every particle of dust. The carpets, seats, blankets, etc., are left on the platform until the interior of the car is cleaned. The hose furnishing compressed air is then taken into the interior of the car, and dust is removed from every part of the interior by this means. A force of car cleaners is then put to work with buckets of hot water, and by means of soap and scrubbing brushes the floor of the car is cleaned, the interior woodwork being wiped off with damp cloths.

"Drinking-water tanks and spittoons are taken out on the platform, where they are cleaned. The water tanks are scrubbed inside and out with hot water and Sapolio, rinsed with clean water, and then placed over a steam pipe and sterilized with live steam." †

It is noticed that the compressed air to remove the dust is used subsequent to disinfection by formaldehyde gas, but whilst this method of removal may have its advantages where irregular surfaces are concerned, the vacuum process would seem preferable, in that scattering of dust would not be necessary as a first step.

Water.

How not to prime pumps.

The following extract from the Report of the Bureau of Health for the Philippine Islands for 1914 [p. 10] demonstrates the value of routine bacteriological examination of water supplies (even when supposed to be fully protected) in securing the "reason why" of infection.

*Federated Malay States Medical Report, 1914.

†U.S. Public Health Reports, 1915. Mar. 12. Vol. 30. No. 11.

"Considerable difficulty has been encountered during the past year by the presence of colon bacilli and other pathogenic organisms which were found in artesian wells that were free of these bacteria at the time that the wells were first opened. It seems likely that the infection is due to the habit of 'priming' the pumps of wells which have to be pumped. Briefly, investigation has shown that in many instances the water from the nearest carabao wallow or other contaminated source is poured into the pump and thus the infection probably takes place. At least this apparently accounts for some of the difficulties. It has been attempted to relieve this infection by constant pumping with a steam pump with the hope of actually flooding it out. This, however, has seldom been successful. Later, large quantities of potassium permanganate and in many instances calcium hypochlorite have been placed in the wells and allowed to remain there for some days and then pumping operations begun. A number of wells have been freed of infection in this way."*

Sulphate of Copper Treatment of Water.

The sudden acquirement by stored water supplies of vile odours is well recognised as ordinarily due to particular micro-organisms and algae. A water in open reservoirs once sensibly infected is liable, with recurring favourable meteorological conditions, to give trouble. The employment of sulphate of copper is an excellent remedial agent, but obviously, as usual, prevention is better than cure. In this sense the beneficial influence of general cleanliness of storage and freedom from organic matter by previous filtration is emphasized by the experience gained at the Philadelphia water works, as reported by Francis D. West, the officer in charge of the laboratory.* The behaviour of organisms in the reservoirs is contrasted. The Wenty farm reservoir is lined with brick and had been employed "for many years before the water of the Delaware river was filtered." Its constant use prevented its being systematically cleaned and, as a result, it contained about 2 feet of mud. The conditions were therefore favourable for retention of contaminating algae and micro-organisms. On the other hand, the Oak Lane reservoir was lined with asphalt, presenting a contrast to the comparatively irregular surface of brick and, as it was employed after introduction of filtration, had no deposit of mud.

The Wenty reservoir contents gave rise to "numerous complaints of tastes and odours . . . the organisms chiefly present being *Conferva*, *Protococcus* and *Asterionella*."

A system of estimating the amount of contamination was then instituted by a microscopic count of units per cc. and was maintained for both reservoirs; it being determined by watching the Oak Lane reservoir to forestall any tendency to undesirable increase of organisms.

In 1910, the Wenty Farm reservoir organisms amounted to "25,000 standard units per cc. with a turbidity of 5, due entirely to microscopic growth." 0·5 of copper sulphate was then applied per million parts of the reservoir water content. This killed a few fish, but by nine days the standard units were reduced to 622. In three weeks, an increase to 17,000 occurring, 0·25 parts per million of copper sulphate was used. No fish were killed, and the standard units fell to 2,200 in four days.

*Engineering Record. 1914. May 9, p. 523.

In the Oak Lane reservoir it was found that the organism counts did not justify interference from 1910 to 1912, when it received one treatment against three found necessary in the case of the Wenty farm reservoir, apparently the highest count at any time being 13,000, which dropped to 100. Mr. Francis West draws the following conclusions :—

"It is evident that it is of considerable advantage to store filtered water in clean reservoirs, and that if any microscopic growth does develop about one treatment a year is sufficient. In reservoirs containing mud considerable microscopic growth takes place, necessitating careful watching and several treatments, otherwise the water will be apt to give rise to complaints of taste and odor."

The bacteria counts following the different treatments make an interesting study ; part are given in the table :—

Bacteria following copper sulphate treatment.

Oak Lane Reservoir.		Wenty Farm Reservoir.	
Date.	Bacteria per cc.	Date.	Bacteria per cc.
19/6/11	6 before	9/6/11	6 before
19	2 1 hour after	9	340 1 hour after
20	0	11	6,500 2 days ,,
21	4	12	2,000
23	4	14	620
24	8	16	220
29	5	20	46

"Undoubtedly, in the case of the Oak Lane reservoir, the copper sulphate killed not only the algae but also any bacteria developing from the decomposition. In the case of Wenty Farm the decomposing algae probably mix with the deposits on the bottom and saprophytic bacteria develop. No pathogenic bacteria were found. We have practically no algae in the reservoirs containing filtered water from the Schuylbill River. This is probably due to the fact that the amount of organic material in solution, as revealed by the oxygen consumed test, is less than one-half that of the Delaware."

Food.

Jail Diets.

In this *Bulletin* [Sanitation Number, Vol. 6, No. 5, p. 270] the extent to which alteration of diet, probable release of the more feeble on account of the Delhi Durbar or improved sanitation, was responsible for the steady improvement and, finally, record mortality figure, in 1913, of 7·9 per mille in a jail population of 11,400 was discussed. The Inspector General of Jails, Madras Presidency, was inclined to place great weight upon the factor of change of diet ; the writer, whilst admitting that the principles on which McCay's dietetic dicta are founded are correct, considered it possible that when dealing with dry grain eaters adjustment of items in the interests of economy might prove necessary ; and that no proof of increased weight with

the decreased and better adjusted diet had occurred as suggested by the Inspector General. Further evidence as to the influence of the new diet is now available, in the Report of the Administration of the Jails of the Madras Presidency for 1914. The table on the opposite page will show the facts as to the Hospital admissions and mortality rates.

The weightments as contrasted with 1912, when the diet was still unchanged, were as follows :—

Period.	Percentage of total discharged who gained weight.	Percentage of total discharged who lost weight.	Remarks.
1912 ..	68·55	18·65	Old diet
1913 ..	63·60	20·29	New diet
1914 ..	65·46	17·85	

It is thus evident there has been a falling off, not an increase of weight, with the adjusted diet.

The Inspector-General also was of opinion that whilst dysentery "seemed to pick out the jails where the kitchens are defective and the flies are allowed more access to food than they ought to be . . . much of the improvement that has taken place might with reason be attributed to the appropriateness of the new dietary." This influence has also not been apparent in the medical history of the jails in 1914, as shown by the following figures :—

Diseases	Ratio per mille of average strength.							
	1911.		1912.		1913.		1914.	
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Dysentery	33·00	1·69	35·30	1·07	22·61	·58	39·77	·94

If then the theory that the Delhi Durbar remission of sentences of imprisonment gave release to many sickly men is correct, and the sudden improvement of the mortality rate in 1913 was due to this, it remains that the improvement in that year was but a continued result of previous sanitary efforts, and *inter alia* improvements in water supplies, and protection of latrines and kitchens against flies.

In remarking on the increase of dysentery in 1914 the Inspector-General, however, calls attention, in extenuation, to the fact that officers of the Indian Medical Service attached to the Prison Department were largely replaced, owing to military exigencies, during the year by other medical and lay officers, less experienced in jail routine and that some alterations in methods of care may have occurred.

HOSPITAL ADMISSIONS AND MORTALITY RATES.

Years.	Daily average number of prisoners.	Daily average sick.	Ratio per mille of daily sick.	Deaths.			Death-Rate.		
				From cholera.	From other causes.	Total.	From cholera.	From other causes.	Total.
1910 ..	12,997	256	19·7	2	186	188	·2	14·3	14·5
1911 ..	12,168	237	19·5	5	159	164	·4	13·1	13·5
1912 ..	11,332	218	19·2	16	115	131	1·4	10·2	11·6
1913 ..	11,400	180	15·8	8	82	90	·7	7·2	7·9
1914 ..	11,327	180	15·9	4	130	134	·3	11·5	11·8

That argument however would only be applicable to disease prevention by measures against dysentery and not to the theory of improved dietary.

On the whole, therefore, the second year's history of the trial of McCay's dietary would show that the Inspector-General of Prisons has been somewhat unduly enthusiastic on the subject, and that his measures for prevention of disease have been the most potent factors in the improvement of health and diminution of the death-rate, and not increased resistance by alteration of the diet.

But the fact remains that a two years' trial of a diet, reduced in weight as to total staple grains, but adjusted as to its carbonaceous and proteid constituents, has certainly not proved harmful, and in so far Lt.-Col. Macnamara, I.M.S. has justified his advice. This being so, McCay's contention that such adjustment should bring about marked economy should have followed. On the contrary, the diet charges per head have increased from Rs.35.09 in 1912 to Rs.39.12.8 in 1914. This is certainly due to the free use of rice* as part of the diet, instead of trusting to adjustment of the nutritive value of the cheaper dry grains to which the mass of the people in the Madras Presidency, except on high days and holidays, are accustomed.

In the absence of economy and of any proof of better health of prisoners (notwithstanding the inevitable sensation of vacuum inflicted) this experiment of altering a diet which had not proved *per se* inimical (unless in respect to small amount of vegetables allowed) and which closely followed the habits of the majority of the people, would seem to have little purpose, beyond establishing the correctness of McCay's views.

The variations required to secure adjustment of constituents of diet in the jails of the United Provinces, India, represent efforts in the direction of suitable utilization of various grains. In practice, the excellent health condition of the jails in that Province [see this number under Reports] suffices to show that no marked error in diet exists. The scale of diet for hard labour for males and method of variation, reproduced below, are from page 40 (*a*) of the Report referred to.

Fixed Diets.

In dealing with fixed diets for bodies of men, or prescribing diets for famine relief on a wage basis for vegetarians, in view of the great difference in chemical composition (especially in the amount of proteids) found in various grains, their respective digestibility and extensive wastage in preparation for cooking, it is evident that an adjustment of weights of grain in relation to other, specially proteid bearing, substances is essential. In the United Provinces, the following diet is given to all adult male prisoners sentenced to rigorous imprisonments—

*The Inspector-General refers to orders of Government of Madras giving rice to those certified to be accustomed to it; but no differentiation is made as to rice employed in hard labour diet.

Scale No. I. Nitrogen—280. Carbon—5268·7.

	Cereal pulse combination.	Dal.	Vegetables.	Oil.	Chillies.	Salt.	Firewood.
	Ch.	Ch.	Ch.	Ch.	No.	Grs.	Ch.
Daily ..	14	1	3	4/25	1	150	5

From 1st April to 1st November a daily ration of either one ounce of lime-juice, 70 grains "amchur," 70 grains "putwa," or 140 grains tamarind pulp should be given.

The 14 chittacks* cereal pulse combination is invariably to be made up according to the subjoined table :—

	Combination letter.	Principal.		Adjuvant.		Total.
		Grain.†	Quantity.	Grain.	Quantity.	
Highest nitrogen–282.3 Lowest nitrogen–277.8 Carbon constant.			Ch.		Ch.	Ch.
	a	Wheat	11	Barley	3	14
	b	Bajra	12	Pulse	2	14
	c	Makka	12	Do.	2	14
	d	Marua	$11\frac{1}{2}$	Do.	$2\frac{1}{2}$	14
	e	Wheat	$11\frac{1}{2}$	Do.	$2\frac{1}{2}$	14
	f	Juar	11	Do.	3	14
	g	Barley	11	Do.	3	14
	h	Rice	$10\frac{1}{4}$	Do.	$3\frac{3}{4}$	14

Note.—Any two of the above may be combined by taking half of each principal and half of each adjuvant: thus $\frac{b + c}{2}$ will give bajra 6 chittacks + makka 6 chittacks + pulse 2 chittacks = 14, or $\frac{a + g}{2}$ will give wheat $5\frac{1}{2}$ chittacks + barley 7 + pulse $1\frac{1}{2}$ = 14.

If rice is cheap it may be used in the form of bread or boiled as "*khichri*"; in either case the combination should be $\frac{a + h}{2}$, that is, rice $5\frac{1}{8}$ + wheat $5\frac{1}{2}$ + barley $1\frac{1}{2}$ + pulse $1\frac{7}{8}$ = 14.

When the rice is given as "*khichri*," the wheat and barley are to be given as bread.

*Chittack = 2·05 ounces avoirdupois.
Amchur = sundried mangoes.
Khichri = rice with dal flavouring and colouring material, oil or clarified butter boiled together till cooked and dry.

†Makka = Maize (*Zea mays*).
Bajra = *Penicillaria spicata.*
Marua = *Eleusine coracana.*
Juar = *Soorghum vulgare.*

Diet in Beriberi.

Beriberi, in its literal sense, is merely applicable to a symptom of a diseased condition in the human subject, which causes a sheeplike waddle in walking. When certain other classical symptoms of derangement of nerve and cardiac control accompany this gait, the affection is popularly known as beriberi. That this disease is rightly classed as a "deficiency disease," there must in the present day be few dissentients. But the diagnosis of beriberi rests upon no single pathognomonic sign; the disease is brought within the recognized definition of beriberi by consideration of a group of symptoms. Certain of these are common to mere derangements, which may be classed as peripheral or poly-"neuritis." If the evidence of epidemics of beriberi be examined, it does not follow that the vitamine theory is fully applicable. This may mean that the history as to diet is defective, that the diagnosis was incorrect, or that observers are dealing with diseases having a largely similar train of symptoms but a different causation. Thus, it is possible to connect beriberi with sites, and to discount the vitamine theory, and there are members of the profession who would contend that the disease is insect borne. As to the food deficiency theory, attention has been chiefly fixed on the connection of the disease with rice; whilst there are suggestions as to changed conditions of substance such as might attend tinned foods. The Japanese apparently met the difficulty in their Navy by increase of nitrogenous elements in the diet prescribed, but other changes doubtless occurred synchronously as, for example, in the general environment of the men. Rice as a grain defective in proteids especially lays itself open to suspicion from this point of view. Then as to this article of diet (before the deprivation of the subpericarpal layer was invested with importance) milling was thought in some way to be related to its phosphatic contents. That it should be possible to cure beriberi by an extract of the pericarpal layer would go a long way towards proof of the evil influence of polishing rice, and would bring attention to the question of how far this layer may be rendered impotent under the influence of moulds, as well as by removal in milling. Whilst, therefore, there is a general agreement as to beriberi being placed under deficiency diseases, there is obviously ample room for investigations that will render the knowledge so far gained more precise.

In the meantime, members of the profession in the tropics would greatly accelerate conclusions if it was recognized that, in all probability, confusion of opinion results from its not being more usually conceded that there may be forms of epidemic peripheral neuritis, which have yet to be differentiated from the classical beriberi of food deficiency origin. The view that differentiation may be required is freely conceded by FRASER and STANTON who, as successors to BRADDON, have done so much to establish the food deficiency theory. But such recognition demands that if, for example, the observer would support the insect borne theory of epidemic beriberi, he shall not neglect to give, in detail, not only the clinical symptoms but the items and amounts of diet used, its soundness and freedom from moulds, and the mode of cooking employed as well as the grounds for believing hat insects are the bearers. In this way, much important and rustworthy information might shortly be gathered.

On the opposite, to assume, without further enquiry, that but one form of epidemic peripheral neuritis known as beriberi exists, and that to find a flaw in diet suffices to account for its existence in a community, must delay progress.

These general remarks are made with reference to the epidemics which have repeatedly occurred amongst British troops stationed at Lebong. The subject is thus discussed in the Section devoted to the European Army, in the Report of the Sanitary Commissioner with the Government of India 1913—[p. 17 *et seq.*] :—

"In 1911 cases recorded as peripheral neuritis at Lebong were suspected of being beriberi and in the summer of 1911 the officer in charge of the Presidency Brigade Laboratory was sent to inquire into them. He found several cases with oedema, alterations of sensation of the feet and legs, and cardiac symptoms. He stated that the incidence of the disease was greatest in the lowest and dampest barrack rooms. He found that the flour and rice were mouldy from long storage in a damp room and that the mutton was of poor quality. He noted that the privates and lance-corporals (who probably supplemented their food less than the higher ranks) were exclusively affected. Of 14 cases then investigated seven were teetotalers, most of the others only drank a pint of beer a day and the beer contained no arsenic. In view of subsequent events there is, however, little doubt that they were genuine cases of beriberi of varying severity.

"In the autumn of 1913, the Officer Commanding the Station Hospital, Lebong, suspected that many of the cases that were being admitted to hospital or treated in barracks as peripheral neuritis were in reality beriberi, and asked for a committee to inquire into it. Majors E. D. W. Greig, I.M.S., F. Harvey, and J. C. Kennedy, R.A.M.C., and Captain C. J. Davys, I.M.S., were appointed and in their report state that "the patients shown to them were suffering from beriberi" and there was "no good reason to attribute the patients' condition to any other cause." *They considered that this disease had existed in the garrison at Lebong for some years but that the cases were of a mild type and difficult to recognise.* [Italics not in original.]

"Their report went on to suggest that the food of the troops at Lebong was wanting to some extent in its natural activating principles and so led to defective metabolism and a lowered state of nutrition. It was noted that the disease was confined to the troops at Lebong, and was not present among the civil population in the neighbourhood. The rations supplied to the troops, especially the meat and vegetables, were described as of poor quality, the diet monotonous, and the cooking inferior.

"In the same year another series of cases of "peripheral neuritis" occurred at Barrackpore. There were 19 admissions for this disease—11 of which originated in that station. Of these only one was severe and it is reported that "the remainder were of a milder type than those that had occurred in the two preceding years. Of these 11 cases, 8 belonged to the detachment of the 2nd King's Own Regiment, 2 to the 7th Battery, Royal Field Artillery, and one to the Supply and Transport Corps. Six of the King's Own Regiment admitted, had occupied the same barrack room between the 14th March and 29th April, 1913, and this room had been occupied between the 23rd February and 10th March by two men convalescent from the same disease contracted in the preceding year. Shortly afterwards this room was temporarily occupied by men of the 2nd Black Watch from Calcutta, among whom two cases occurred; further, one of the two occupied the bed cot which had been used by one of the invalids and the other a cot placed in the verandah adjoining and very near by. The two cases already mentioned in the 7th Battery, Royal Field Artillery, were preceded by 6 cases in the same unit in 1912 and of this total of 8 cases 6 are noticed as having occurred in men occupying a particular barrack room at one time or another. The Medical Officer states: "These facts appear to be more than a coincidence and lead to the opinion that beriberi is not a food disease, but due to infection or communicated by insects." No reference is made as to the rations of the men.

"To revert to Lebong, the view that the cases returned as peripheral neuritis at that station during the last few years were genuine beriberi may be accepted. It can hardly be accepted as proven, however, that the rations issued at Lebong were specially deficient in vitamines, and in view of the Barrackpore cases it is possible that some other factors may have been in operation. In Darjeeling the disease was limited to Lebong, and the troops at Jalapahar a mile or two away never suffered from it; there was no apparent difference between the rations the Lebong garrison received and those issued to other soldiers throughout India including Jalapahar. The culinary arrangements at Lebong as described by the Committee were not satisfactory but this hardly explains the successive outbreaks of the disease that have occurred in different infantry units stationed there in recent years.

"It appears to be premature to arrive at any definite opinion regarding these outbreaks. Should cases occur again in 1914 further inquiries will be instituted."*

In this connection the Public Health Report for the Zanzibar Protectorate for 1913, by Major SKELTON may be referred to. He shows that in a jail where a part of the diet was rice, but entirely of the unpolished variety, 79 beriberi cases occurred between 1907 and 1913.

"Previous to August, 1912, the prisoners occupied an old jail which was bug (*Cimex rotundatus*) infested in the highest degree. In November, 1910, the Principal Medical Officer, gave orders that the sleeping mats of all prisoners and troops should be boiled once a week. He demonstrated at that time that the prison cell walls harboured bugs in any quantity; that white washing, unless the walls were previously scraped clean and afterwards cemented, was useless; he demanded that the cell walls should be cemented, and though this was done in the case of two cells, it was found to be too expensive to carry out the work for the whole jail. Following the cleansing methods adopted by Mr. McDonald, the incidence of beriberi fell in 1911, in the case of prisoners by nearly 40 per cent. [from 13 to 8], while in the case of the troops no case at all occurred in 1912 or 1913 [7 in 1911]."

Major SKELTON proposed to make experiments on bug transmission of beriberi in 1914–15.

In the Shanghai jail, where beriberi has persisted for a long period, the following opinions have been given by Dr. Noel DAVIS (*a*)† and Dr. Arthur STANLEY (*b*)‡ respectively, on the subject:—

(*a*) "In Shanghai, in the Municipal Jail for Chinese, in spite of the use of adequate diet, including beans and pork as well as partly milled rice beriberi occurs, and it has been observed to do so and to increase *pari passu* with infestation of the jail with parasites—notably bugs—and to decline after thorough disinfection had been carried out. The indication is an infection transmitted by these or other parasites."

(*b*) "The incidence of beriberi among the Municipal prisoners has diminished. The cause of this disease remains under close observation, though up to the present wrapt in obscurity. The evidence preponderates in favour of the disease being an infective one having no direct relation to food but infective through body vermin. . . . At the gaol there were 2 cases as against 27, 34, 134, 0, 0, 2, 2, 2, 1, 5, 78, 16, 7, and 2 in succeeding years since 1899."

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*Since the above was in type the writer is in receipt of the September Number (No. 3, Vol. 25) of the *Journal of the Royal Army Medical Corps.* In this is a very careful report by Major KENNEDY, who was placed on special duty at Lebong to carry out the recommendations of the Committee. The Report will be noticed in the next issue of the Sanitation Number of this *Bulletin.*

†Transactions of the XIIIth International Congress of Medicine, London, 1913. Section 21. Pt. 2. p. 118.

‡Shanghai Municipal Council, Health Department Annual Report, 1913.

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RICE MEAL FE

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No. 4 fed on wheat shorts

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It is evident that in the cases of Lebong, Zanzibar and Shanghai, were the symptoms and *details* of diet placed before the reader, there would have accumulated matter aiding materially the evaluation of opinion as to the dual theory of causation of the beriberi.

The domestic fowl has been largely the subject of experimental production of a disease resembling beriberi. The pig however offers perhaps conditions which are more analogous to those found in human beings, at least in so far as it favours a very mixed diet. Experiments have recently been conducted at the Agassiz Experimental farm, British Columbia, in the Dominion of Canada Department of Agriculture, which should prove of much interest on the subject of vitamines generally, and of the position of rice in diet in relation to disease in particular. The general conduct of experimental feeding is in the hands of Mr. MOORE, but in the course of investigations Dr. Seymour HADWEN, D.V.Sc., in charge of the Veterinary Research Laboratory, was requested to undertake the pathological study of a disease in pigs produced by the feeding of rice meal. The accompanying reproduced photographs show the marked contrast between rice meal and wheat-fed animals. In his Report on the subject,* Dr. Seymour HADWEN states that on examining the animals he was struck " with the resemblance of the symptoms to those described for beriberi in human beings and all the evidence which has since come out strengthens this theory."

It is as yet impossible to arrive at any decision on the subject in the absence of results of chemical analysis of the rice-meal which was utilized. This is being undertaken. In the meantime, the writer has ascertained that the meal employed was of Japanese or Chinese origin; and unless it be ultimately shown that these varieties differ widely from the usual composition of the rice-meal of commerce, the experiment must possess the peculiar interest of the foods including, in a proportion unusual in a diet, the sub-pericarpal layers, the absence of which has been regarded as the chief cause of food deficiency in respect to polished rice, and an extract of which it has been sought to use for curative purposes.

Where there are opportunities of carrying out similar experiments, the following analysis of " rice meal," as ordinarily understood commercially, reported by Dr. F. J. WARTH and Mr. D. B. DARABSETT,† may be of utility to those undertaking them :—

Bhussi or meal from cones and polishers.

	Good.	Medium.	Poor.
Moisture	11·07	11·09	10·18
Oil	10·67	6·04	2·71
Proteid	10·40	8·45	6·89
Carbo-hydrate ..	44·12	41·93	39·16
Fibre	9·54	17·60	25·76
Ash	14·20	14·89	15·30

*Dept. of Agriculture, Division of Animal Husbandry, Sessional paper, No. 16, and Report of Veterinary Director General, Canada, for the year 1914.

†Bulletin No. 10 of 1913, Department of Agriculture, Burma.

Mineral constituents of by-products [of milling rice grain ("paddy")] per 100 parts.

Constituents.	Meal from polishers.	Meal for shipment.	Mill dust.	Husk.
Sand ($Si\ O_2$) ..	·970	1·402	11·50	17·180
Lime (CaO) ..	·040	·061	·068	
Magnesia (Mg O).	·175	·990	·499	
Phosphoric acid ($P_2\ O_5$) ..	2·816	3·858	1·092	·041
Potash	—	1·464	—	—
Nitrogen (N) ..	1·640	1·880	1·127	·027

The contrast, as shown by the reproduced photographs, between the rice-meal fed and the wheat-fed animal is certainly very marked.

Diet in Pellagra.

In Vol. 4, No. 8 [Sanitation Number] of this *Bulletin* [pp. 444–445] reference was made to the views of Dr. Hugh S. STANNUS on the subject of pellagra as it occurred in the Central Prison of Zomba, Nyasaland. The opinion formed by the writer was that, in the correct spirit of enquiry, Dr. STANNUS was endeavouring to balance the pros and cons of an "unsupplemented rice" diet in causation, especially with reference to damaged grain and the Simuliidae theories. The writer invited particular attention to the radically incorrect diet in the Zomba prison, irrespective of condition of the rice employed. Dr. STANNUS, in a letter to the Director, is now able to give the interesting statement that, on his recommendation, during 1914 (evidently previous to receipt of the writer's remarks) the diet of the prisoners was changed, and that he believes (for he is now absent on field service) that "at most one or two cases of pellagra appeared after a more generous and varied diet [nature of change not stated] had been instituted in the prison, whether a direct result or not I cannot say." As to the opinion of Dr. STANNUS that pellagra exists in Zanzibar and that Simuliidae are also found, he now states that his assertion as to the presence of the Diptera was in trust of other medical officers' statements.

In reviewing the facts brought together by Dr. STANNUS, the writer was not disposed to place great value upon the white line at the angles of the mouth and the condition of the oral cavity held by Dr. STANNUS to be necessarily characteristic of pellagra, as he had found these symptoms to be not infrequent sequels in natives of India, "partaking of salt fish on the verge of decomposition"; and he pointed to the fact that the diet used in the Zomba jail permitted "an unstated amount of fish or meat once a fortnight." Dr. STANNUS fails to see the analogy, and urges that the fish used in Zomba is not salted but sun dried. This being so, the writer suggests it would be more likely to fulfil the condition at intervals of being "on the verge of decomposition," to which accidental condition alone and not to the presence of salt, in the case of Indians, he would ascribe the evil influence on the oral cavity.

Dr. STANNUS would now further strengthen his opinion as to characteristic mouth symptoms as follows :—" Note should also be made that the condition of the corners of the mouth is often reproduced at the free margin of the prepuce. Does this occur in Indian eaters of salt fish ? " The writer regrets he cannot give information as to the state of the prepuce in such cases, but he believes there is no reason to think any evil result occurs from eating *sound* salted fish. Dr. STANNUS would follow his opinion as to the diagnostic value of the " white line " in pellagra, by suggesting that perhaps pellagra exists in India. This may well be so, but the writer is not aware of cases being definitely so recognized.

Dr. F. M. SANDWITH, in a paper recently read before the Society of Tropical Medicine and Hygiene,* after a review of the various theories extant as to pellagra, definitely favours this disease being caused by absence of " vitamines," and therefore would class it with " deficiency " diseases. The connection with maize he, therefore, regards as purely accidental, as in beriberi with rice. Nevertheless, he thinks it desirable it should be ascertained what, if any, connection unsound maize may have with aggravating conditions favouring the disease. With the aid of Dr. Hugh MACLEAN, Chemical Pathologist, Jenner Laboratory, St. Thomas's Hospital, experiments to this end have been inaugurated by Dr. SANDWITH.

A series of experiments with guinea-pigs was necessary, as a first step, to show the minimum of green food (cabbage) and sound maize necessary to sustain life. This having been settled, it was possible to substitute " bad maize " for the good. It has been impossible to carry on these experiments fully " on account of war difficulties " ; but Dr. SANDWITH found that, so far as feeding on " good " and " bad " maize for a whole month was concerned, " there was absolutely no difference between the good and bad maize," and adds : " This throws out of court all the short experiments so prevalent in the literature of pellagra."

Milk from Tuberculous Cows.

The South African Union Government Tuberculosis Commission of 1912† have advised attention to the necessity for special measures against bovine tuberculosis. They form the opinion that the disease was due, at an early date, to importation especially of stud animals. It, however, did not attract official attention till about 1904, when the Colonial Veterinary Department investigated the subject. Mr. William ROBERTSON (an officer of that Department) as a result of testing certain herds with tuberculin, formed the opinion that, in the Cape Division, about 60 per cent. of the cattle were infected. By 1906, a " weak Animal Disease Act " was passed, which authorized the use of the tuberculin test and destruction of infected animals, on compensation not exceeding £15 being given. Under this authority, 16,796 animals were tested in the Divisions of the Cape, Malmsbury, Stellenbosch, Paarland, Caledon, with the result that 2·55 per cent. were " reactors." Under these circumstances, the Commissioners have

*Transactions of the Society of Tropical Medicine and Hygiene, 1915. Oct. Vol. 9. No. 1.

†Union of S. Africa. Report of the Tuberculosis Commission, 1914, p. 217.

no hesitation in advising amendment of the "weak" Act; through which, as shown by them, the proverbial "cart and horse" could have met little obstruction *en route.* The italics in this quotation are in the original:—

"(*d*) In the event of any animal being *found to be suffering from tuberculosis*, or to have reacted to the tuberculin test, such animal *may, upon the instructions of the Minister*, be destroyed . . . or the Minister may order the infected animal to be branded with a T and Crown and numbered, and authorise a permit to be issued to the owner to keep the animal under such conditions as the Minister may see fit to impose, with a view to slaughtering it within a period fixed by him, or till such time as the permit is withdrawn."

By a further clause (*f*), if the conditions imposed are infringed, only the Minister (not even the Principal Veterinary Surgeon) can withdraw the permit or order the animal to be destroyed. Furthermore, it is provided by clause (*j*) that:

"No person shall use, sell, barter, or give, or permit to be used, sold, bartered, or given to any person the milk of cows suffering from tuberculosis of the udder unless the milk has been boiled."

From this, it is evident that a person is authorised to sell, barter, or give the milk, infected and unboiled, from a tuberculous cow, provided that the udder be not affected, and presumably he would not be debarred from making and selling butter, cheese and other products made from the unboiled milk, even though it came from a tuberculous udder.

On the subject of sale of milk from infected cows, the Commission express emphatic disapproval, even with the proviso that it be "issued boiled." They recall the facts recorded by the "Royal Commission on human and animal Tuberculosis" as to considerable chances of animals suffering from tuberculosis being apparently healthy and, without obvious infection of the udder, passing tubercle infected milk, and that infected intestinal and uterine discharges may, in the process of milking, reach the milk. In 1903, the Chief of the Bureau of Animal Industry of the United States, in giving a similar opinion, stated that cows may secrete a virulent milk and yet that they are tuberculous is, during life, impossible of detection without the tuberculin test. They finally support their opinion as to necessity of withdrawal of the permission clause to sell boiled tubercle infected milk as follows:—

"In saying this, we may add that while we hold the view that all cows' milk should be either sterilized or boiled before consumption, as a general measure of precaution, yet we cannot believe in the wisdom of consuming milk infected with the organisms of a disease peculiarly fatal to human beings, on the mere assumption that a safeguard most difficult of control, has been properly carried out."

Skimmed Milk.

In the Philippines, owing to poor quality of fresh milk supplied, canned milk was imported. Much of this was found to be skimmed. In the interests of infantile life legislation has provided for taxation of skimmed milk "in whatever form from which the cream has been removed entirely or in part," of 10 cents for each 2·2 pounds.

Milk Purity.

The following are some of the rules now in force in Chicago* :—

"All milk not falling into the class of inspected milk must be pasteurized. To be classed as 'inspected' milk must be produced on farms scoring not less than 70 per cent. and not contain more than 100,000 bacteria per cc. from October 1st to May 1st, nor more than 150,000 bacteria from May 2nd to September 30th. Inspected cream may not contain more than 150,000 bacteria per c.c. from October 1st to May 1st, nor more than 300,000 bacteria from May 2nd to September 30th. . . . . .

"In all continuous pasteurizers the milk and cream must be heated to a temperature to kill 99 per cent. of the bacteria and all pathogenic bacteria in the raw product. The temperature must be not less than 140° F. for 20 minutes or not less than 155° F. for 5 minutes.

"Pasteurized milk must be so labelled, with the date.

"The milk standard requires that milk shall contain not less than 12 per cent. total solids, nor less than 3 per cent. butter fat, nor more than 88 per cent. watery fluid. The standard for cream is fixed at not less than 15 per cent. butter fat. Persons offering milk below standard for sale are subject to a fine.

"Skimmed milk must be shipped in cans painted red and labelled 'Skimmed milk.'

"Milk and cream transported into the city or delivered from point to point must not be at a temperature higher than 55° F.

"Milk can not be sent from dairies or sold from milk depots and stores where a communicable disease exists in an employee or in his family.

"Adulteration and addition of colouring or preservative agents are forbidden.

"Cows must not be fed on slops or refuse of breweries and vinegar factories; nor may milk be sold from cows 15 days before to one week after parturition."

Senior Surgeon J. C. Perry, who quotes the above rules, adds observations as to method of administration from which the following extract is given :—

"Frequent inspections are made of pasteurizing plants while in operation, and the temperature of the milk in different stages of the process and the length of time held are carefully studied, with the feeding apparatus adjusted so that the milk is properly pasteurized. Examination is made as to technique and cleanliness of equipment and insanitary conditions or improper handling of the milk are corrected. By taking samples for bacteriological examination at different stages of the process, the efficiency of the pasteurizer is determined. Before a licence is granted to new plants, three specially trained inspectors examine and regulate them. Automatic temperature recording devices must be attached to each pasteurizer.

"A special card is used for scoring pasteurizing plants, which takes into consideration three important factors: Location and construction of room, including light, ventilation, floors and walls, where pasteurizing apparatus is installed; the equipment, integral parts of the plant itself, and the methods of handling. The last is given as much weight as the other two combined. This, in my opinion, is correct and should constitute the critical score as to whether a plant conforms to requirements or not."

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*U.S. Public Health Reports, 1915. Aug. 27. Vol. 30. No. 35, p. 2537.

Tuberculous Meat.

The Royal Commission on Human and Animal Tuberculosis* advises that animals suffering from tuberculosis might be used for human food under the following condition :—

"(*a*) When the lesions are confined to the lungs and the thoracic lymphatic glands. "(*b*) When the lesions are confined to the liver. "(*c*) When the lesions are confined to the pharyngeal lymphatic glands. "(*d*) When the lesions are confined to any combination of the foregoing but are collectively small in extent.	The carcase, if otherwise healthy, shall not be condemned, but every part of it containing tuberculous lesions shall be seized.
"(*a*) When there is miliary tuberculosis of both lungs. "(*b*) When tuberculous lesions are present on the pleura and peritoneum. "(*c*) When tuberculous lesions are present in the muscular system, or in the lymphatic glands embedded in or between the muscles. "(*d*) When tuberculous lesions exist in any part of an emaciated carcase.	The entire carcase and all the organs may be seized."

The South African Union Tuberculosis Commission, whilst not in agreement with the practice thus advised, express themselves as not "inclined to specifically condemn it," but they would guard sale of meat under such conditions by the following desirable proviso :—

"They are, however, unanimous in the opinion that such meat should not be sold to the public on the same footing as meat from a perfectly healthy animal. They consider that the purchaser has the right to be informed of the origin of the meat he is buying, and they therefore recommend that all such should be branded in such a manner as to clearly indicate its origin to the purchaser."

*Union of South Africa. Report of the Tuberculosis Commission, 1914.

SANITARY ORGANISATION.

Education in Hygiene of the Future Official.

British Administrators of the period of Crecy awarded to the sanitary experts with their forces the rank and pay of the drummer. This was in accord with the popular estimate of the surgeon and of the science of disease prevention of the period. Perhaps it found its correct level; yet, as in the present day, there was possibly a lingering suspicion in those practising preventive medicine that administrators, by reason of their failure to appreciate the bearing of its doctrines upon the political economy of nations, hampered social advance. Sir Ronald Ross in his Chadwick Lectures* had no hesitation in arriving at the opinion that not until administrators were required to undergo a course of hygiene in their youth would its public importance be apparent to them.

The Evolution of a Public Health Service.

In a Sanitation Number of this *Bulletin* [Vol. 5, No. 8, p. 470] there was suggested a type sanitary organization in the tropics. Confirmation of this type being closely in accordance with the general trend of the opinions of sanitarians is forthcoming, in the description of the sanitary organization of New South Wales. Here it is found that, instead of the administration of sanitary matters being relegated to a mere branch of an office meant to deal primarily with other subjects, New South Wales has already attained the ambition of possessing a Minister of Public Health.

Under this Minister "the permanent head of the organization is the Director-General of Public Health (Dr. Robt. T. Paton) who has a staff of Medical Officers and Inspectors and also holds the position of President of the Board of Health. As far as the Metropolis is concerned, the Metropolitan Medical Officer of Health, appointed by the Government, is an officer attached to the office of the Director-General of Public Health. . . . By making the City Health Officer also an officer of the Board of Health, it is found that as far as medical supervision is concerned, it is possible to have some uniformity of control and there is an avoidance of any friction which might occur if the City Health Officer were a separate officer, working quite apart from the Board."†

The tendency to link up allied Departments, so as to form a homogeneous administrative unit, is also distinctly shown in the New South Wales Public Health administration. Arrangements exist for the close intercommunication and allied action of the Veterinary and Agricultural Departments. In the care of the latter is the control of the butter and cheese factories of the State and of the former, the Meat Export Depot of the Commonwealth. Both research and the forwarding of the interests of routine Applied Hygiene are served by the Government Bureau of Microbiology, which includes an animal vaccine farm. Qualified Sanitary Inspectors are employed in both urban and rural areas. In the endeavour to educate the lay public, a Sanitary Mission of the Public Health Service has been opened in Sydney.

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*Journal of State Medicine, 1915. Apr. Vol. 23. No. 4, pp. 97–106.

†Report of the Director-General of Public Health, New South Wales, for the year 1913.

As regards organization, whether it be in the care of the born or unborn members of the future generation, in the rectification of errors in town planning, or in the prevention of disease, the Report of the Director General shows that in sanitation New South Wales is living up to the resolve "Advance Australia."

Dr. Robert T. PATON in recording the fact that he succeeds Dr. ASHBURTON THOMPSON, does not fail to invite attention to the strenuous pioneer work of that officer during 28 years, which has placed the Public Health Service in its present position.

EDUCATION OF THE PUBLIC IN HYGIENE.

It is a foregone conclusion that if sanitation were correctly appreciated the average inhabitants of the tropics would demand better hygienic condition of their environments, would pay the necessary taxes for improvements with a good grace, and might practice self abnegation in the interests of their fellow men. But the problem is not so simple when it becomes necessary to say exactly how this correct appreciation is to be secured.

The officers of Educational Departments, however, usually have no doubt on the subject. The correct course to them is obvious: Introduce compulsory education, teach the child of the future generation the three Rs, and he will acquire an appreciation of hygiene; go beyond this limit in educational acquirements, and there will be produced the Local Authorities who will vote cheerfully for the necessary taxes, and will delay the erection of ornate offices in favour of improved public conservancy.

In discussing details of such a proposition, there must always exist a general agreement with the plain fact that an educated man (even if his knowledge is limited to the three Rs) is more likely to appreciate and act upon sanitary dictates than an unsophisticated inhabitant of the "bush." But, this being admitted, practical experience shows that abstract education is not a panacea, and that to secure its benefit there can be no rule of thumb procedure adapted to all people. Hence the following opinions expressed in papers on the subject at the last Congress* at Saigon (1913) are of interest.

Dr. E. S. TYAU† advocated "School Instruction as the leading factor," the required instruction in elementary principles of hygiene being combined with illustrative talks on school ventilation, fresh air, cleanliness, diet, infection, oral hygiene, wholesome food, personal methods of "eating, sleeping and exercising and such essentials of hygiene." Next, speaking presumably only of Christian communities, he considered the churches afford an excellent medium for demonstration of health principles—the object being to show that "disease is not a necessary evil sent by a destroying God." He pointed to the necessity for the recognition of the influence of the women of the community when "organized especially for medical social service" and finally pointed to "the potent agency of the Press." He gave an instance of the utilization of this factor in the case of an American

* Far East. Assoc. Trop. Med. C.R. Trois Congrès Biennal, Saigon (1913), 1914.

† A Plea for a Campaign of Public Health Education in China.—*China Medical Jl.* 1915. July. Vol. 29. No. 4.

Society " which appoints certain of its members to write a communication to the county papers once a week." He believes that such a campaign would be aided by " baby saving shows and similar exhibits."

Dr. Arthur STANLEY* laid emphasis upon the necessity for effort by correctly organised public bodies, aided by trained superior and subordinate staffs. He would not wait for the results of demonstration " by flags, feasts and photographs " to expedite sanitary reforms, but, having secured a public body supported by suitable laws, would proceed to bring about by due tact disease prevention. He believes that " however desirable it may be to let all efforts for the amelioration of public health be voluntary on the part of the public, such would be utopian under present conditions in the homeland, and would be still more impracticable in China."

So far as education of the public is concerned, he would advise the drawing up of notices in simple language, and the giving of " frequent popular lectures and demonstrations, at the branch offices. . . . The main thing in China would appear to be to prevent waste of effort, and to direct energy into the right channels on those measures which mean most."

Dr. W. W. PETER, whilst recognising the importance of education of the people that they may understand the object of public sanitary measures, considers essential the recognition of public health officers as the exponents of sanitary requirements, and also places his faith in correct organization. He stated † :—

" Most of these preventable diseases are now known to be due to social conditions beyond the control of the individual. This means that the remedy is not alone the treatment of the patient by the individual doctor, but rather the broad treatment of the entire social organism by all the constructive forces available, the medical profession included among the foremost."

Dr. WU LIEN TEH‡ in introducing his subject pays a tribute to curative medicine. He considers that " no branch of Medical Missionary work appeals more to Chinese than the fine surgical skill shown by Missionary Surgeons throughout the hospitals of China. With the establishment of more modern hospitals and the arrival of keen surgeons this reputation will be enhanced, and will lead to a quicker appreciation of western medicine by the people." He then refers to writings " handed down from the Chow dynasty " showing that the Chinese possessed a " Sanitary conscience " which though now latent is capable of being awakened. To this end he would demand more attention to hygiene as part of medical teaching, whilst he would encourage the publication of popular articles in the press. Finally, he would advise that " teacher, magistrate, police officer, merchant, mother of the home (if she can read), and every schoolboy and girl should possess " sanitary knowledge, of which he furnishes an outline under nine heads. His organization would embrace a Central Medical Council consisting of a representative member from each medical school, in which would be given a place for an Education

*" How to initiate Public Health Work in Chinese Cities."—*China Medical Jl.* 1915. July. Vol. 29. No. 4.

†" Public Health Education in China."—*Ibid.*]

‡" Awaking the Sanitary Conscience of China."—*Ibid.*

officer; the establishment of "Sanitary Boards," systematic teaching of elementary hygiene in schools, the establishment of "Social Leagues" for "public health propagation" with a Central Public Health Institute in the capital of the country. His ideal is that "at this Institute all information and help relating to hygiene and sanitation could be obtained if required, and the records for the whole country kept," *plus* all up-to-date laboratories dealing with bacteriology, vaccines, and sera. He believes that "such an Institute, although costing a considerable sum at the beginning would, if properly managed, yield enough after a term of years to pay all expenses."

Dr. Wu Lien Teh (an officer who dealt largely with the North Manchurian epidemic of plague) concludes his paper by showing that his representations to the Central Government of China have already secured "the enforcement of certain hygienic regulations on all government railways," and the approval of his plan "for the introduction of hygiene primers into schools."

The Formation of the "Sanitary Conscience" in the Tropics.

In the preceding notes, the authors referred to exhibit considerable faith in teaching hygiene in Elementary Schools. So long as this is not coupled with the belief that by this means it should be possible to relax public sanitary efforts and the execution of sanitary works pending the advent of a public "sanitary conscience," there can be no doubt of its utility. But in schools of insanitary construction, situated in villages innocent of suitable water or conservancy arrangements, it must be of remarkably little use to tell a child how matters in these respects should be. Equally so is it of little utility to inform a public which has never seen a town under reasonably good sanitary condition, that such and such steps are requisite, and expect therefrom the growth of public opinion; if by that is meant, not the opinion of exceptional educated individuals possessed of official or other influence, but the mass of the people. Some may not readily grant a distinction need exist; they would educate the mass of the people and believe that public opinion in favour of sanitation must follow. This is not devoid of truth, if time be not considered; but if public sanitary improvements are to be held up till this opinion is formed the millenium must be awaited.

Where then is the compromise between the two views to be found? The writer conceives it must be recognized that present-day elementary education afforded to the masses cannot in practice proceed beyond the stage of preparing the mind for impressions, and that these should be superadded by methods that leave the least possible need for the exercise of imagination or reasoning powers. An approach to such views is exhibited by the authors above alluded to, in that they place their faith not solely in pamphlets but in lantern slides and exhibitions. In the two latter details there is the closest approach to the true form of education of the masses that can be made, namely, by practical demonstration of results of completed sanitary works.

To this end the best aid a school can afford hygiene is not by taxing the imagination by solely cramming with theories, *but by itself being a practical illustration of correct building, ventilation, conservancy and water supply.* Practical attention also to cleanliness, care of eyesight

and teeth and physical culture are great factors in securing education in personal hygiene.

In attempting the elementary education of the masses, it is fatal to neglect the education of their women folk. So long as the women are not hygienists, any approach to disease prevention in the home, where the influence of general education should naturally make itself felt, can be but of a halting nature. This is peculiarly the case in India, where caste (in so far as it is wrongly interpreted by custom) in the present day may be defied by the educated man, but where he is practically helpless within his own household.

But elementary school education, whilst representing possibilities for the next generation if conveyed to pupils with due care as to practical demonstration, will not materially aid present day public advance. Here again education by demonstration is the only rational method available. The method is not complex in its educative influence; it appeals largely subconsciously to the powerful instinct of self-interest, as represented by increased chances of convenience and improved health; and it has the advantage of appealing not only to the uneducated masses but to "men of light and leading."

Education by demonstration is feasible in the hands of public authorities by their executing sanitary works against malaria, especially when combined with agricultural improvements, public water supply and conservancy. Such matters must be carried with extraordinary want of tact if they offend the most conservative of people; whilst it need not be said that all experience goes to show that if works are so designed as to accomplish, in practice, their sanitary aims, no people is so devoid of brains as not to appreciate the ends secured in increased health and comfort.

In short, whilst domestic hygiene must wait to a considerable extent upon elementary education and economic advance of a people, Applied Hygiene by means of public improvements *by demonstration is the best aid to rapid education in domestic hygiene and the ensuring of economic advance.* An ounce of practice being worth a ton of theory the following extracts from published official Reports by the writer may afford illustrations, in practice, of education of the masses by demonstration, and of the hopelessness of forming a public "sanitary conscience" in the absence of such demonstration amongst a people possessed of academic education of a high order.

An instance had occurred where a street had been reformed and drained in a rural town, at the expense of a District Board. At the same time a private individual, as a matter of philanthropy, had been good enough to undertake the drainage of cattle sheds and courtyards in the private premises. The mental effect on the inhabitants is thus described* :—

"Where the people were well off they were fired by pride not to accept this charity, and carried out the work to our satisfaction by their own money. From being an evil smelling narrow tortuous street Berhumals Street, as it was subsequently called in grateful acknowledgement of the generous donor, became the street where the well-to-do now prefer to have their dwellings. Not only did Mr. Berhumal's action do good to Nandyal, but I believe to other villages as well, as villagers used to make pilgrimages to see the improvements in the private premises, and became convinced that if they must live side by side with cattle it can be effected in a fairly cleanly method."

* Madras, G.O. No. 653 M. Dated June 2nd, 1902.

Indeed, in a distant village (Buswaripett) the inhabitants volunteered to pay half the cost of public drainage, as a result of the demonstration of increased cleanliness and convenience they had witnessed.

In the second example, a Municipality had failed to enforce its powers as to private night-soil conservancy, and notwithstanding that probably not a single house in the area concerned did not contain heads of families highly educated in the Western sense, there certainly existed no "sanitary conscience."

"There is a tank known as the ———, the edges of which are inhabited by highly respectable persons of a high caste of natives. In spite of protestations by the Municipality, their ordinary procedure is to defaecate all round the tank immediately in front of their houses on the high road, in such proximity as not only to form a nuisance by reason of sight and smell but to be absolutely indecent, having regard to the fact that the houses contain mixed sexes. On my last inspection, I personally interviewed a well-educated *vakil* [lawyer] on the subject, and pointed out to him what an anachronism this conditions of affairs represented, and asked him whether it would not be possible for all educated men in the neighbourhood to make their influence so felt as to form a 'public opinion,' against which the more sanitarily inclined of the neighbours could find it impossible to rebel. He however told me whatever might be his own feelings on the subject, it would be impossible to exert the influence I suggested. At the time of my visit on that occasion, I happened to arrive just before the toti [night soil scavenger] had performed his ordinary occupation of proceeding round the tank, and the condition was found to be that simply of an ordinary public latrine. 'History repeats itself'—occasionally. After an interval of two years, I again visited this tank and on this occasion I interviewed another of the best known vakils in the neighbourhood and told him of my former visit and of my (as it was now evident) useless appeal to his educated fellow citizen. He also fully concurred with me as to the degraded condition of affairs that I pointed out, but he agreed with his predecessor that any formation of 'public opinion' was impossible. On this date I had arrived somewhat later on my inspection and the toti had preceded me, but his work was far from complete, and there were endless signs of recent sanitary sins. Whilst inspecting the tank the passage of urine direct into the water, and the washing of clothing at the same spot seemed to one person intent on cleanliness by no means incompatible."*

In their Notes on this Report the Municipality concerned, whilst stating that "every endeavour will be made to bring all the neighbourhood under the private scavenging system," added as to the "Sanitary conscience" question the following definite judgment on the lack of influence of high education:—"Public opinion of this kind is non-existent." Obviously, without demonstration as to the decency and comfort obtainable from correct methods of night soil collection and removal, even well educated men are incapable of a sufficiently accurate effort of imagination to form a trustworthy "sanitary conscience." What then is to be expected of the masses who have mastered the "three R's" but have never drunk water free of risks of gross pollution, in the absence of a public conservancy system? Education must ever be an important ally of the sanitarian; but it is absurd, even with its aid, to rely upon the average man of the masses, who dwells in filthy environments, forming a conception of communal cleanliness which he has never witnessed, or of the resulting benefit to public health which he has never known.

*Madras G.O. No. 743 M. dated 15th April, 1905.

International Epidemic Prevention.

The question of the risk of infection of India by yellow fever was dealt with by the deputation of Major James, I.M.S., to visit ports likely to be more largely used on the new routes which will be adopted by vessels passing through the Panama Canal. As a corollary, Dr. Hossack, for many years Port Health Officer of Calcutta, was deputed by the Government of India to study modern sanitary methods of dealing with seaborne traffic, as conducted in Europe. The following is an account of his paper* :—

Surveillance v. Quarantine.—He pointed out that existing quarantine stations in Europe are now rarely used, as the various Governments concerned trust largely to a system of surveillance by securing the address of passengers, and require that their health state be ascertained at points of arrival; and this tendency has been largely confirmed by the Paris Convention of 1912, which permits the substitution of surveillance for quarantine. He states that it is only in the case of persons whose addresses are not ascertainable and reliable, such as emigrants or steerage passengers in the East, that detention is retained as a permissive measure.

The Organization of a Maritime Sanitary Service.—He particularly calls attention to the French organization of a "Commercial Maritime Medical Service." He states :—

"All doctors who wish to serve on ships have to pass a special medical examination in tropical disease and marine sanitary law. A special official register is maintained by the Chief Medical Officer of the maritime district and only those who are properly qualified are admitted to the register. They have to report themselves periodically and are *quasi* state functionaries. They themselves and also their employers make a compulsory contribution to the State Pension Fund and even when, after a time, they retire to practice on shore, they are entitled to continue their contributions. Port Sanitary Officers are recruited from the ranks of the mercantile and medical marine. The result is that marine doctors as a class are reliable men of good qualifications. I have found this to be so in my own limited personal experience. A secondary result of this is that the sanitary authorities can give considerable latitude, confident that infectious disease on boardship will be adequately treated by the ship's own staff."

Dr. Hossack further urges reform in the minor ports of India, and attention to the necessity for *improved methods of securing early intelligence of disease spread in various countries trading with India.*

Disinfection of vessels.—On the subject of disinfection of vessels, with special reference to rats, fleas and mosquitoes, he agrees that the Clayton disinfecting apparatus is the best available; but, in view of the fact that Professor Rosenhaim has shown that at 5 per cent. of sulphur dioxide spontaneous ignition occurs in the presence of charcoal, he advises further experiments be made as to substitution of other gaseous agents or, failing this, ascertaining how far danger is likely to occur at 3 per cent. air dilution of sulphur dioxide, which is the full amount necessary for destruction of both rats and insects. The question is of importance in those cases where charcoal packing is

*"Report on a Visit to various European Ports in Reference to existing Quarantine and Sanitary Arrangements and the Measures proposed against the Introduction of Yellow Fever into India."—*Indian Journal of Medical Research,* 1915. Jan. Vol. 2. No. 3, pp. 791–813.

used for insulation of refrigerators. In Amsterdam and Hamburg, he found the Rubner apparatus, which provides for the use of formaldehyde vapour under a partial vacuum,* employed for disinfection of articles liable to be destroyed by steam. He regards the organization for dealing with inspection of vessels, and for preventive measures as well exemplified at Marseilles and Hamburg.

Observation Depots for Emigrants.—The depôt for emigrants at Hamburg is described as a model town providing accommodation for 12,000 persons, and arranged so as to have divisions for race and sex. Here medical sanitation is carried out with extreme care, even a special Ophthalmological Depôt being provided.

Inspection of imported food articles.—The department for food inspection in this port is also fully organized, 36 assistant doctors and 26 chemists being employed under a director and two assistant directors. They deal with such material as wines, butter, milk and butter substitutes, whilst a separate establishment deals with meats and fats. It is of international interest to note that the full organization at this port possesses " no agency to trace the ultimate destination of goods that are detained or condemned but subsequently removed."

Economy in Establishment for Food Inspection.—He examined the method of inspection of food stuffs, especially of meat, as conducted at Liverpool and London, and in both these places he noted an important principle guiding staff organization, which does not seem to have been adopted in Hamburg, as he there found certain sections of the staff with no more duty than might be expected " at a provincial museum." He states :—

" Great importance is paid to the absolute necessity of co-operation with the commercial organisation concerned, and one of the first consequence of this is that, when special inspection of any particular line of goods is found necessary, the detailed inspection is carried out not at the quay side, as is the preliminary rough percentage inspection, but at the cold storage depôts themselves."

He gives an instance of overwork of the staff due to defects ascertained in particular food stuffs inspected, but this was recognized as likely to be temporary, because :—

" It was anticipated that in a very short time the strictness of inspection would, for commercial reasons, cause inspection to be done at the other end, the export centre, and that soon a little casual inspection would suffice at the import centre. *This had been their experience in the past where similar problems had had to be dealt with.*" [Italics not in the original.]

The writer would add that the principle is also safe in application to the work of Urban Health Departments provided prices of food articles are not forced up unreasonably by inspection costs, at either the place of supply or sale. It will be found that the sanitation of dairies, bakeries, slaughter-houses, mineral water factories and noxious trades, will rapidly undergo improvement at the hands of the trades concerned as a result of inspection, enforced by legislation, and co-ordination of interests ; so that what may appear, at first sight, a

*Messrs. Manlove and Alliott, Nottingham, provided the writer with an apparatus to attach to their disinfecting machines when in the vacuum stage of operation (their B.C. 1244 of 1907), which fulfils this requirement

gigantic effort requiring numerous staffs resolves itself, in course of time, into a system of orderly routine work at comparatively little expenditure by selected experts. Such soothing facts are worth holding in mind by the sanitarian, in attempting to persuade a *non-possumus* local authority to take its first strenuous step in food and trade protection.

The World Spread of Epidemic Disease.

In a previous Sanitation Number of this *Bulletin*, the writer has pointed to the excellent organization maintained by the United States Public Health Service, for securing rapid intelligence of epidemic diseases prevailing in countries in communication with America. In the large foreign ports are stationed expert Port Health Officers and, in the minor ports, American Consuls are charged with the duty of forwarding prompt information of disease prevalence.

The map supplied in the *United States Public Health Bulletin*, No. 64, of February 1914, showing extent of spread of cholera, plague, and yellow fever throughout the world in 1913, also throws light on the subject. The spots representing cholera are thick in the proximity of the shores of the Black Sea, in Asia Minor, the Balkans, Austria and Italy; Germany is not spotless, and even England possesses one blemish. If the now established human carrier theory is of any value, the possibilities of spread amongst the various armies now in the field and thence to civil populations cannot be ignored. Hence, the tracing of the present position of this tropical disease in Europe is of some interest.

The *U.S. Public Health Reports* of September 3rd gives facts as to world spread of epidemic disease up to the end of June 1915, and in a summary of the position it is stated :—

"On the whole, it is thought that the quarantine situation demands more attention from everyone concerned than demanded in the past, so far as cholera, typhus fevers and plague are concerned, and with the cessation of hostilities there is every indication that the work and responsibilities of the Public Health Service will be increased to an immeasurable degree."

In short in view of possibilities, irrespective of routine international duties, it is requisite that the important functions fulfilled by Port Health Officers, even in minor ports, should be carefully co-ordinated. The matter is quite of as great importance as the protection of infantile life, which now causes solicitude to sanitarians and patriots.

In Hungary, to the end of June, there were 510 cases of cholera; in the same month, the disease was prevalent in 23 places in Silesia. In July, 1915, there were in prison camps in Germany 215 cases of cholera. In August, cases occurred in Kherson, Odessa and Theodosia in Russia; and, according to the "Telegraaf," in September cholera was present in Wiesbaden, Oppeln, Breslau, Dantzig, Königsberg, Spandau, Bromberg, Hanover and Leipzig.

In the matter of plague, it is stated :—

"The disease is reported prevalent in various localities in Greece, chiefly Piraeus and Saloniki. In Turkey, the presence of the disease at such places as Bagdad, Smyrna, Jaffa and Beirut is of importance. Likewise is its presence at Alexandria and Port Said."

The Scope of Utility of Routine Port Health Duties.

The Port Health Officer's attitude towards disease is ordinarily defensive, with but occasional necessities for adopting the offensive defensive. Consequently the capture and disarming of a single bearer of cerebro-spinal meningitis, cholera, typhus, small-pox, etc. may be regarded as a matter of little public importance. He has only done his duty; but what if he had neglected in one single instance to take upon himself that daily strain of attention to detail by which alone success can be secured. A single act of carelessness may mean the overwhelming of populations by epidemic disease. Figures supplied in a paper by Dr. Arthur Foy, Port Health Officer, Rangoon, read before the Berlin Congress of the Institute of Public Health in 1913, are not only useful in conveying some idea of the work conducted in a typical port in the tropics, but of the chances of importation of plague cases; in so far as these are significant of the proportion to total immigrants of possible bearers of infected fleas. *The nearest infected port was distant not less than four days by steam.*

In eight years, 2,224,260 immigrants were inspected physically; all cases exhibiting during the process suspicious symptoms or feverishness perceptible to the hand were subjected to the taking of temperatures by the thermometer. If this corroborated suspicion, the subjects were retained in an observation hospital, pending a decision as to cause. There were examined by thermometer 61,141, and of these 30,977 were placed under observation. Twenty-three plague cases were thus discovered, affording a ratio of 1 in 90,000 infected. Amongst immigrants arriving from known infected ports and areas to the number of 383,839 in four years, there were 19 cases discovered or 1 in 20,000.

Although Calcutta was infected in 1897 and Rangoon is the chief port in Burma in communication with it, both this port and the Province of Burma remained free of plague up to 1905. No plague amongst rats has been found on ships entering the port.

For all steerage immigrants from infected ports or ports serving infected areas steam disinfection of clothing has been systematically used and, since Burma was itself infected, the clothing of emigrants and their property was likewise treated up to 1909 and since that time those proceeding for foreign ports. Formaldehyde disinfection is conducted of articles liable to deterioration by the steam process.

Beyond plague, which is here specially referred to, by port health inspection numerous cases of both small-pox and cholera were detected and thus danger to the Province prevented. The figures quoted by Dr. Foy suffice to show that a Port Health Officer requires a sound "sanitary conscience," if the routine of masses inspected without disease detection is not to lull him to a sense of safety.

Deratization of Vessels.

To information supplied by his paper quoted in the preceding note Dr. Foy has kindly afforded the writer further figures of work in the Rangoon port. The following will show that whilst it is desirable, as suggested by Dr. Hossack (*vide supra*), that the question whether less than the 5 per cent. of sulphur dioxide in contact with charcoal is dangerous be ascertained, this amount is not only unnecessary for

destruction of both rats and insects, but it is rarely that 3 per cent. is exceeded in practice.* Thus Dr. Foy's records show that rats were found dead after exposure to the following percentages of sulphur dioxide in 43 holds of vessels.

Per cent. of gas.	*No. of holds.*
1·75	2
2	2
2·25	2
2·5	3
2·75	6
3	14
3·25	3
3·5	2
3·75	1
4	6
5	1
5·5	1

The following statement shows to what extent the total hold accommodation of vessels was found inhabited by rats :—

In 1	out of	5	holds in	1	vessel	=	20	per cent.	of the	vessel.
1	,,	4	,,	1	,,	=	25	,,	,,	,,
2	,,	5	,,	2	,,	=	40	,,	,,	,,
3	,,	5	,,	2	,,	=	60	,,	,,	,,
4	,,	6	,,	1	,,	=	66	,,	,,	,,
5	,,	7	,,	1	,,	=	71	,,	,,	,,
3	,,	4	,,	1	,,	=	75	,,	,,	,,
4	,,	4	,,	1	,,	=	100	,,	,,	,,
5	,,	5	,,	1	,,	=	100	,,	,,	,,

In the case of 26 vessels in which the number of rats and mice was noted, the following figures were obtained :—Under 5 rats and mice, in 6 vessels ; from 6 to 10, in 4 ; 11 to 15, in 3 ; 16 to 20, in 1 ; 21 to 25, in 2 ; 26 to 30, in 1 ; 31 to 40, in 1 ; 41 to 50, in 2 ; 51 to 60, in 1 ; 61 to 70, in 2 ; over 70 in 3.

Sanitary Exhibitions and Museums.

The Report of the Director General of Public Health, New South Wales, shows [p. 47] that efforts towards public education was made during 1913 by the exhibition of various models presented by the Federal Government. The Report of the Medical Department for Queensland [pp. 5 and 13] states that this method of educating the public has also been elaborated in Queensland.

In the *United States Public Health Reports* (May 7th, 1915, p. 1,377) there is an account of the important hygienic exhibits at San Francisco in connection with the Panama-Pacific International Exhibition.

*Under conditions of air tightness in holds it is possible to get 3 per cent. of sulphur dioxide ; but the writer found that in both masonry and wooden houses, carefully prepared by paper sealing, this concentration, owing to numerous air inlets such as are likely to exist in tropical houses, was difficult of attainment, when working with the Clayton machine.

Such efforts need some thinking out lest the representation of a useful subject be forgotten, and the San Francisco experience, therefore, may be useful to other promoters of sanitary exhibitions. The Special Sections provided for were, under *Social or sex hygiene*—(*a*) tuberculosis; (*b*) drugs, with special reference to harmful and fraudulent characters of patent products; (*c*) mouth hygiene; (*d*) alcohol and drug habits, contrasted with food values; (*e*) mental hygiene and psychiatry; (*f*) industrial hygiene; (*g*) school hygiene; (*h*) models of city water-supply and sewerage systems; (*i*) *Tropical Medicine and Hygiene*, largely illustrated by models showing improvements in villages, latrines, bathing arrangements and other items as adapted to native habits. Cuba is well represented in illustration of progress made as to malaria and yellow fever. (*j*) appliances illustrative of *Infant hygiene*. (*k*) Eugenics [probably for the first time in an important exhibition] has a large section to itself under the auspices of the "National Race Betterment Association." Here the "possibilities and methods for race betterment" are illustrated by statistics, photographs, models, engravings and charts. (*l*) The *Military Hygiene* exhibit is very complete and is largely the work of the Imperial Government of Japan. (*m*) The United States Public Health Service by models, transparencies and charts (moving and still) exhibits the mode of spread of the various infectious diseases, and affords models of institutions and laboratories and other objects and duties, in illustration of the work of the Service "in preventing and controlling diseases." An unusual but very desirable adjunct to such an exhibition is that of the two large Insurance Societies exhibit of "statistical facts amplified by pathological and other illustrations." These Societies doubtless have their own ends to gain, but they must possess the power of forcing upon the attention of the public the meaning of sanitation, as expressed in the saving of human life in its economic aspects.

In a paper on Industrial Hygiene by Surgeon J. W. Schereschewsky*, the use of travelling exhibitions and cinema pictures is advocated. In the more advanced areas in the tropics, it should be possible to arrange such exhibitions in one or more railway carriages, and for lecturers thus fortified by apparatus and exhibits to pass from town to town on education tours.

Health Office Records.

Each Health Officer doubtless has his own methods of keeping his records, but it is rarely that a statement is available beyond office precincts. Hence the writer thinks the following extract from the Report of the Medical Officer of Health (Metropolitan Combined Sanitary Districts) for Sydney (Dr. Purdey) may afford items of useful information in office organization:—

"There is a complete record arranged on the card-index system of every dwelling and business premises within the City, giving a description of premises; nature of business, if any; complaints made with regard thereto; notices served; diseases notified; deaths; legal action; and results; inspections. In addition, a register is kept of fifty licensed common lodging houses, a register of 900 milk vendors, a register of noxious trades, and a register of infectious diseases.

* U.S. Public Health Reports 1915. Oct. 1. Vol. 30. No. 40.

"A daily return is obtained from the Registrar of all deaths in the City; a register is also kept of all prosecutions and Police Court proceedings.

"With regard to the routine clerical work of the office of the Metropolitan Medical Officer of Health, this is carried out by Mr. V. Roberts, a clerk of the Department of Public Health.

"On receipt of notifications of infectious diseases forwarded by the Town Clerks of municipalities, these are stamped with the date of receipt and with respect to disease. The name of the municipality to which the case should be debited is then filled in at the top of the notification, and the patient's name entered in the index.

"As all cases of infectious disease admitted to hospitals have also to be notified through the local authority in whose district the hospital is situated, these have to be checked with notifications from general medical practitioners.

"Particulars of all notifications are then entered on cards, different colours being used for each disease, and these cards are arranged under the different metropolitan and extra metropolitan municipalities.

"Special Report Sheets are also kept, to show the incidence of infectious disease in each district.

"A record is also kept of the milk supplies of infected households. This is also arranged alphabetically on the card index system, a separate card being allotted each dairyman or milk vendor.

"A special note is made of a report of infectious disease from a dairy or the premises of a milk vendor in order that immediate action may be taken.

"Whenever an unusual number of cases occur among the customers of a dairyman or milk vendor, a list is submitted to the M.O.H. Lists are also made out for the information of the P.M.O., Department of Public Instruction, when several children attending the same school are found to be suffering from an infectious disease.

"Record is made in cases of infectious disease taking place in inmates and nurses of institutions and hospitals.

"In case of notification of typhoid fever a special form has to be filled in by the Sanitary Inspector of the district where the case has occurred.

"Returns of deaths from infectious diseases and from all causes among infants under one year are received from the District Registrars each week. These have to be checked as regards registration numbers to ascertain that none have been omitted or included twice. On a return of a death from a notifiable infectious disease it is necessary to ascertain by reference to the Infectious Disease Card Index whether it has been notified."*

Medico-Legal or Public Health Duties.

In the Appendix to the Medical Report on Western Australia for 1914, Dr. Cyril H. Shearman gives an account of the work of the Laboratory attached to the Public Health Service. The arrangements for this part of the organization are in the transition stage, necessarily, common to several State methods elsewhere than in Australia. The Bacteriologist and Pathologist is saddled with medico-legal duties. In this instance, the total cases attended to were small, but even so such work is ordinarily inconsistent with Public Health demands—although there is a stage in progress in the tropics when for economical reasons the combination must be tolerated. Duty of such a nature as to involve, as it often must, the life or freedom of criminal subjects places at intervals a special burden upon the Laboratory worker, in which one or other duty must be temporized with. This is added to by *personal attendance being required at Courts.* In India, where medico-legal work in each Province is of a most extensive nature, a certificate giving

*New South Wales. Report of the Director General of Public Health for the year ended 31st December, 1913, p. 92.

facts solely as to articles forming an exhibition or case is furnished by the official dealing with such duty—the Chemical Examiner to the Government of the area concerned. This is admitted as legal evidence, whilst the local medical officer in Government employment who is the local medico-legal expert may be, and ordinarily is, examined both by the prosecution and defence as to the significance of the Chemical Examiner's evidence as to the exhibits, in relation to all the facts of the case. There is no reason to think the absence of the Chemical Examiner defeats justice. The local medical officer as a Government servant obtains no fee, and in practice it is so well recognised that his evidence is impartial that it is rarely that either prosecution or defence elect to summon further medical evidence; and thus the not always edifying spectacle of doctors differing in courts on vital medico-legal points is equally rare. A similar ruling in some of the Colonies would conduce to laboratory skill being economized in favour of Public Health demands, until medico-legal work assumed sufficient importance to require the appointment of an expert devoted solely to such duties.

Travelling Facilities for Sanitary Staffs.

It is a matter of importance in dealing with sanitary staffs that they shall have facilities for rapid transit within the area under their charge. This secures financial economy as to number of men employed, in that time spent in slow travel may be more usefully utilized in rapid enquiry and action where epidemic diseases are concerned. In towns, it is possible that a Sanitary Inspector provided with a pony, or humble "bike," may have a tendency to useless speed with resulting less careful enquiry as to local conditions than advisable; this abuse can however be duly repressed by supervising officers.

Where inspecting officers of any grade are concerned, the means of rapid locomotion is desirable even in towns. In epidemics, the attachment of mounted orderlies and the free use of telephones will greatly aid rapid action.

In rural areas, the arrangement by which both subordinates and officers are provided with special allowances for maintenance of horses, or other mode of quick transport, cannot be dispensed with in the interests of economy of finance and personnel.

The Government of India has ruled that special facilities for advances of pay shall be allowed to certain grades of its officials to enable them to purchase motor cars. More recently, these facilities have been extended to officers who would be content with motor cycles.

Petrol will, doubtless, in other parts of the tropics bring about the abolition of "hammocks" in favour of motors on practicable roads, and of slow sailing schooners for inspection of riverine and island stations. Inspection by aviation is a dream of the near future.

The Clinical Laboratory.

The clinical laboratory in hospital administration is a well acknowledged item in the present day, and Sierra Leone, according to the Annual Report of the Medical Department for 1914, has since 1913 undertaken work of the nature required seriously. The Laboratory was under the charge of Dr. Young and Dr. Butler for six months,

respectively. The (West Africa) Yellow Fever Commission, represented by Dr. DALZIEL and Dr. JOHNSON and Mr. BACOT also used the laboratory.

As a matter of routine " examinations of the urine, faeces and night blood of every patient admitted has been insisted upon." The records of laboratory work are maintained in special forms " which have proved useful in that they keep all the laboratory returns for each patient together." These forms are arranged so as to exhibit results of examination of material as follows :—1. *Examination of Blood* for (*a*) malaria, (*b*) trypanosomes, (*c*) microfilaria, (*d*) leucocyte counts. 2. *Examination of* (*a*) urine, (*b*) faeces, (*c*) sputum, (*d*) pus from different sources. 3. *Reactions*—(*a*) typhoid and paratyphoid, (*b*) Wassermann. 4. *Examination of* material gained by gland puncture and scrapings of ulcers and leprous nodules. 5. *Post mortems.*

Staphylococcal vaccines were prepared and, in one case, " the effect of treatment was watched by estimation of the phagocytic index."

In 634 examinations for malaria the following results were obtained :—Subtertian 214, quartan 58, benign 2, subtertian and quartan 13, negative 328 ; showing malaria parasites present in 287 or 46·6 per cent.

A total of 964 " night bloods " and 7 " day bloods " yielded microfilaria in 9·7 per cent. In the Freetown Jail, they were present in 11·8 per cent. of 118 prisoners.

Of 986 patients examined, ankylostome ova were found in 30 per cent. In the last quarter of the year, by washing and centrifuging about a drachm of each specimen the percentage rose to 44·4 per cent.

Tubercle bacilli were found in the sputum of 27 of 100 patients examined.

These statistics furnish a clue to general local conditions in Sierra Leone. It was not possible to differentiate tribes and races of patients examined.

WESTERN AUSTRALIA.

The healthy tendency of the present day sanitarian to regard his duties as intimately connected with the economic advance of the area as to which he advises the authorities holding the purse strings, is well exhibited in the " Annual Report for 1914 (Western Australia) on Medical, Health, Factories, Early closing." The Commissioner of Public Health expresses the value of Applied Hygiene in figures illustrating the saving of life, or discusses cause of failure to save life, in relation to the social well being of the people and to the demands upon public funds. In his official function as Principal Medical Officer and Commissioner of Public Health, he represents both Curative and Preventive Medicine. He has however no hesitation in pronouncing which of these branches is of the greater importance to the State. Curative Medicine in Western Australia is so well provided for that there is a hospital bed for every 225 of the total population. He makes no lengthy disquisition on the subject, but furnishes the information that " the cost per head of populations in 1914 was :—

	s.	*d.*
Hospitals	4	11¼
Health	0	7·2
Factories	0	·79

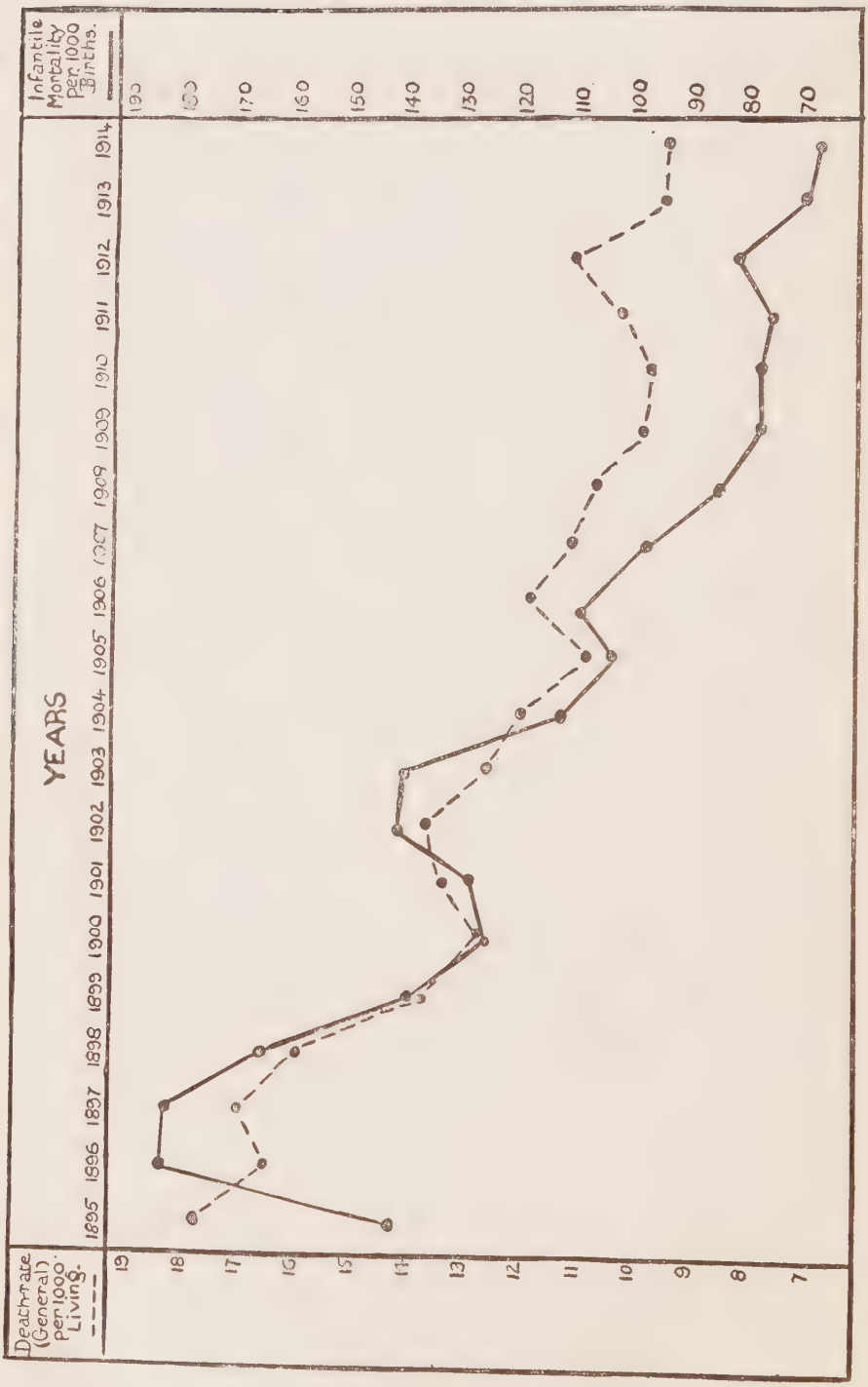

Chart showing the decline of the death-rate (general), and infantile mortality-rate. Years 1895–1914.

This statement of facts is followed by a single brief but expressive comment :—" It will be a creditable time when the cost of prevention more equalises the cost of cure."

Under the section of the Report devoted to Public Health, he more specifically points to the position which Preventive Medicine must occupy in State administration :—

" Scientific and legislative effect is in relationship as cause and effect. The question of the numbers and health of the community are questions at the root of the existence of the State, in almost as great a degree as the question of the State's ability to guard itself in war. The one time question of defence from war is now the equally national one of defence from disease."

Figures for income and expenditure under the local Public Health Act are afforded ; but as the items are confined to administration, it is not possible to judge how far sanitation has been aided under Sanitary Works, or under what other heads the bulk of the expenditure has occurred. Hence, the writer does not quote these otherwise important figures.

That such funds as have been available in Western Australia have been judiciously spent in sanitary interest is sufficiently evident from the remarkable chart furnished, which shows a steady improvement through a series of years not only in the general death rate but in that delicate test of the environment and habits of the population—the infantile death rate. It is a chart that the Sanitary Officers responsible in the past and present may well regard with pride.

Pursuing his theme of State economic value of Applied Hygiene, Dr. Hope gives the following calculation, estimating the losses by the single disease typhoid :—

" The value of a life of a person to a state is worth	£300
" Allowing a very liberal discount of 50 per cent., the value of 247 lives may be set down at £150 each	£37,050
" Taking the period of incapacity of those cases of 20 years of age and over, i.e., 2,238, and assessing the cost of illness and loss of wages at £16 each	£35,808
	£72,858

The Government of Western Australia has for the past 18 months offered antityphoid vaccine gratis to all applicants.

SANITARY RULINGS.

Quarantine.

Small-pox epidemics have been so little known in Australia that vaccination has not been much sought after by the average inhabitant, with the natural result that on this disease appearing a public scare is possible. The legislation on the subject at one stage of the smallpox epidemic of 1913 in New South Wales was also not free of panic as, notwithstanding sanitary advice to the contrary, the Federal Government insisted upon "declaring Sydney a quarantine area within a radius of 15 miles." Ultimately, combined sanitary advice and representations on behalf of commercial interest secured removal of the measure. Quarantine was then substituted by the following ruling :—

"Each person leaving the State signed an undertaking to report himself to the Health Authorities of the State to which he proceeded, in the event of his suffering from any sickness within twenty-one days of his leaving New South Wales." *

Tuberculosis.

The South African Union Government Tuberculosis Commission, in advising notification of tuberculosis, thus discuss the advisability of cognizance being taken of one or both forms of the disease :—

"It is true that a patient is only dangerous to others when actually discharging living tubercle bacilli, and that the extent to which he is a danger depends, other things being the same, upon the quantity and the manner of the discharge, but while, according to these criteria, the pulmonary form of the disease with much tuberculous expectoration, is the most dangerous to others, it by no means follows that other forms of the disease may not under suitable conditions, be discharging infective material and be dangerous to associates, as, for instance, the dejecta in a case of tuberculous disease of the bowels.

"There is, of course, the alternative of ignoring the particular form of the disease and deciding the question on the basis of its particular state ; that is to say whether it is in the condition of discharging infective material —the so-called 'open tuberculosis,' or is not in an infective condition— the so-called 'closed tuberculosis.' It is, however, by no means easy to decide exactly when the condition of a patient is not infective, and in any case it is both unreasonable and inadvisable to place the onus of such a decision upon the notifying medical man ; and as no such responsibility could be placed upon a layman, dual notification would have to be discarded. . . .

"It is, therefore, preferable to require *every* case of clinically recognisable tuberculosis to be notified, leaving it to the medical officer of health to decide in each case, upon a consideration of all the attendant circumstances, the degree of danger existing for others. By 'clinically recognisable' we mean displaying some other signs or symptoms than the mere reaction to the tuberculin tests."

These considerations led them then to advise that "every case of clinically recognisable form of the disease" be notified.

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*Report of the Director General of Public Health, New South Wales, for the year ended 31st December, 1913.

A Private Hospital Act.

New South Wales possesses, since 1908, the power to secure control of all private hospitals throughout the State, both as to structure and management. In 1914, there were 451 applications for licenses. Examples are given of the working of the Act during 1914, showing it has a considerable scope of utility.

In instances where septic puerperal cases have occurred, notices are issued prohibiting admission of further cases, pending the enforcement of certain regulations. Additions and alterations to structure are zealously watched; as there is a natural tendency to increase accommodation with more regard to cost than sanitary dictate. In others, the admission of patients beyond the number for which the building is registered is forbidden. Some of the wall papers employed were found on analyses to contain arsenic; and the following Amendment of one of the Regulations under the Act was enforced, "owing to the fact that, on analysis, it was found that certain samples of paper sold as sanitary paper contained arsenic." The regulation as amended now reads :—

"The inner walls, partitions and ceilings of every room or ward used for the reception of patients in a private hospital shall have a coating of either paint, cement, plaster, limewash, varnish, or 'sanitary paper' (provided any paper or paint used does not contain arsenic or any other material injurious to health) or such other substance as will admit of effective disinfection."*

* loc. cit,

TREATMENT OF WASTE.

Disposal of Faeces.

The following is a description of a method of dessication of faecal matter advocated by Messrs. Stamp & Powell, Engineers, Melbourne.

"The method of disposal of night-soil in unsewered districts generally recommended has been to discharge the night-soil from the pans into shallow, narrow trenches, and cover it with soil. This necessitates securing a fairly large area of ground in a well-isolated position, so situated that no rivers, creeks, etc., which might be used for domestic purposes, will be contaminated. With the increase of population and spreading out of settled localities, suitable sites within reasonable distance of the townships are becoming most difficult to obtain. In other localities the nature of the soil or the very hilly country render it unsuitable, and the want of an efficient method for the destruction of night-soil has been keenly felt. During the year, however, Stamp and Powell, Engineers, Melbourne, introduced apparatus which was claimed to be capable of drying the night-soil and converting it into a powder, which was inodorous, sterilised, and of considerable value as a manure. A favourable report has been received from Hobart in connection with a similar plant, and Willoughby Council arranged with the firm to instal one near Chatswood. The apparatus consists of a revolving jacketted desiccator fitted with internal steam pipes. The night soil is admitted to the body of the desiccator, steam turned into the jacket and pipes until the liquid is all evaporated by contact with the heated surfaces, the solid residue being put through disintegrators, bagged, and sold as fertiliser, the value of which is quoted at £3 per ton. The offensive vapours given off in the desiccator are drawn by vacuum pumps through a condensing coil, and finally discharged under the furnace, and with the exception of some local effluvia caused by emptying the pans into the desiccator, the process is carried out without nuisance. The polluted water used for washing the pans is treated with the night-soil, and the pans are thoroughly sterilised by steam before being again put into use. The condensed steam from the desiccator is passed through a filter bed, and finally disposed of on a small area of well broken-up ground. The apparatus is capable of being erected in section to treat large or small populations. The proprietors erect and maintain the plant, cleanse and steam the pans at a charge per pan of 2½d."*

The merit of the above machine would seem to the writer to be in the idea of revolving the mass, so as to secure that it is exposed in successive thin layers. Its extensive use would of course depend not so much upon the original outlay on the machine as upon the cost of maintenance of steam in the time required—and as to this no data are afforded in the Report. The extent to which town sweepings could be employed for the purpose would be, in places where coal and wood is expensive, an important point.

Disposal of Sewage by Dilution.

Pettenkofer held that it was safe to discharge untreated sewage in a river, if it did not exceed 6·7 per cent. of its volume. Later, Stearns, of the Massuchessetts Board of Health, held that the proportion should not exceed 2·8 per cent. The Eighth Report of the Royal Commission on Sewage would permit of discharge of sewage

*New South Wales. Report of the Director General of Public Health for the year ended 31st December, 1913, p. 42.

into rivers, after screening, provided the volume of sewage be not greater than 1 to 500 of river water. As time has advanced, therefore, the tendency has not been towards favouring this method of sewage disposal.

Fifteen years back, Chicago noted the fact that the Lake was required to dispose of the sewage of the city as well as furnish its water supply. It was thought that if the sewage were diverted other possible sources of contamination of the lake as a water supply would be negligible, and unfiltered water could be delivered. As to sewage disposal by dilution, although it had been unsuccessful in the lake, it was thought results would be all that was desired in a river. For the latter purpose, extensive works were constructed for diversion by means of a canal to the Chicago River. The proportion allowed for was 3·3 cubic feet of water for the dilution of the sewage of each one thousand people. Of course, experts were produced for and against the scheme, and much valuable bacteriological work was effected, showing the rate at which microbes decreased *pari passu* with distance from point of entrance into the stream. Experience, however, has now shown that the process of simple dilution is unsatisfactory; and, although, in certain areas of the tropics, the changes in organic matters in river water are probably accomplished quicker than in temperate climates, the lessons taught by Chicago experiences are not without applicability—there being a tendency to trust to dumping of untreated night soil in rivers in certain of the Colonies.

A Committee of experts (G. A. Soper, New York, A. J. Martin, London, and John D. Watson, Birmingham) studied the subject of Chicago sewage disposal by dilution for 13 months. From an abstract of their conclusions, given by the *Engineering Record*, September 25th 1915, it is found that they reported that "not an arm or a branch of the Chicago River which include present treatment looked clean." These experts, having regard to the expensive works already completed, have shaped their advice so as not to abandon the principle of disposal by dilution, but they demand extensive preparatory measures. They advise restriction of the volume of both domestic sewage and trade waste fluids, so as not to exceed the volume the water can absorb. They hold that intercepting screens and settling basins must be extensively employed. Granted that the interception of sewage, recognizable as such, is fulfilled, they believe that the hope of excluding all sources of pollution from the lake, which is still the source of water-supply of the city, "is unpracticable, but that the placing of a large territory under central sanitary control is practicable." Consequently, they require that the whole water supply be subjected to efficient filtration.

Chicago is, therefore, faced with the fact that its expensive canal and intercepting sewers of only fifteen years back, intended for disposal of sewage by dilution, cannot fulfil the requirement of final and safe disposal of sewage. Nevertheless, regarded as the main works for diversion of sewage from the lake, they will consort with the more advanced scheme now proposed.

Dumping of Rubbish.

Owing to a sudden change of the incineration system under which ubbish disposal was effected in Chicago, it became necessary to dump

loads of rubbish in an old clay hole excavation so close to inhabited areas as to be likely to produce nuisance. Pending the starting of the pre-existing system, 60,000 tons of rubbish were treated as follows :—

The rubbish was "dumped into vats, which were filled within 2 feet of the top. The garbage was then covered with a 1 per cent. acid solution, equal parts of crude hydrochloric and sulphuric acid being used, and was allowed to remain under this treatment for 12 hours. The liquid was then drained off through openings in the bottom of the vats and when the garbage had become fairly dry, it was picked up by an orange-peel bucket, operated by a crane, and loaded on cars for removal to the hole for dumping. The garbage was distributed over the bottom of the excavation in a layer 1 foot thick, then a layer of ashes 1½ or 2 feet thick was spread over the garbage. This process was continued, layer by layer, in the same manner and proportion of garbage and ashes. . . . The action of the acid is simply to retard decomposition of the garbage until the ashes can become thoroughly mixed with it. In a few months the garbage has become thoroughly disintegrated, and the fill is dry and inoffensive."*

Rubbish Disposal.

The necessity for careful study of currents before disposal of rubbish, night soil or sludge in the sea is advised, is illustrated by the following extract from the New South Wales Medical Report for 1913 :—

"With regard to the taking of refuse to sea, experience in the Metropolis has demonstrated that with certain tides or winds, even when the garbage is taken to a distance of five miles from the harbour heads, portions have been washed up on certain beaches, an occurrence which is objectionable to the residents of any seaside district, but doubly so at such places as Bondi and Manly, where there is so much surf bathing. If this practice of taking refuse to sea is continued the distance from the shore at which it is dumped should be at least 20 miles."

In one locality known to the writer in south India, according to the season of the year, a steady current runs north along the coast for a period and south for another period, with a brief neutral interval ; so that any direct flow out to sea is out of the question within the influence of the current.

Trade Waste Fluids.

In New South Wales, George's River has been "extensively polluted from a wool washing establishment at Liverpool as well as the water of Botany Bay and Cook River. The proprietors have been required to pass the fluids through settling tanks and straining tanks, and subsequently to launch them on to ploughed land for downward filtration. Watching and periodical analysis by the local authorities are requisite in guarding the results."

The writer suggests that in case the factories concerned will not go to the trouble of collecting the fatty scum of the wool washings for the manufacture of lanoline, a profitable industry might be undertaken by the local authorities dealing with the matter. It is possible for trade waste to be wasted.

*U.S. Public Health Reports. 1915. Sept. 24. Vol. 30. No. 39.

SANITARY WORKS.

Subsoil Drainage.

In the Department of Land Records and Agriculture, United Provinces, India, Mr. E. A. Maloney, I.C.S., Commissioner of Agra, publishes a "Note on the level of the water in the subsoil of the Gangetic plain,"* which claims attention from the point of view of malaria prevention. In the first part of the paper, he makes the usual generalization that one third of the rainfall is disposed of by "run off," one third by soakage to the subsoil, and one third by evaporation. He estimates as to the last factor that in the Gangetic plain "it will probably be a fairly accurate estimate that 10 inches of rainfall will on an average be used up in transpiration and evaporation from land that is under crops or trees, and that an amount somewhat less than this will be evaporated from uncultivated land." After adverting to direct flow and the usually acknowledged upward capillary flow from a subsoil, he makes a special point of a similar action downwards "from any source of supply existing at the surface of the earth, and it seems probable that a very large proportion of the subsoil water finds its way down in this manner." He then considers the influence of wells in lowering the subsoil water table, and states that "if at any point any considerable amount of water is drawn from the subsoil by wells it is clear that the rate of flow through the subsoil must be diminished. This diminution will diminish the hydraulic gradient which will in time affect the water level." This however is an assumption not usually accepted in so far as the rate of flow *above* the point of withdrawal is concerned, as at this point the hydraulic gradient is increased. However it can be agreed that "in time" the diminution will affect the water level. He then advances his main argument under cover of a concrete case :—

"The former bad state of the tract of country in the Aligarh and Muttra Districts now served by that Branch canal, is an object lesson of the great damage that may be caused by allowing the subsoil water level to sink excessively. Had it not been possible to bring canal water to that tract, a great deal of good land served by wells would have relapsed into poor dry land with no source of irrigation."

And here he arrives at his main argument—

"A similar result might be caused by drainage. There is no doubt that to drain a swamp pleases the people of the locality, as it renders good land available for agriculture ; but the hidden results to the agriculture of the country dependent on that swamp for a considerable portion of its subsoil water supply may far exceed the advantages obtained by the drainage operations.

The moral and remedy to which Mr. Maloney would point are thus stated :—

"It is a well-known fact that it is possible to reverse the flow of an artesian well by carrying up the well tubing to a suitable height and pouring in water. It is certain that any ordinary well could be made to perform the same function by diverting surface water into it ; but of course the muddy surface water would soon choke up the well, to say nothing of the danger of pollution of the drinking supply. To obviate these difficulties it is clear that the water would have to be filtered before being passed into the well.

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* Bulletin No. 33 of 1915.

"It is probable that it would be a cheap and effective way to sink tube wells in the beds of existing swamps well into the sand beds of the sub-soil, and then fix at the top a filter which would prevent the tube being clogged and also prevent contamination of the sub-soil supply. The filter bed being at the surface could be cleaned or renewed without difficulty. In this way considerable additions could probably be made to the sub-soil supplies."

There seems to the writer in these arguments a want of appreciation of the fact that were subsoil drainage of a swamp carried out, it does not follow that the subsoil water need be lowered to a depth to endanger wells, and that the real function of drainage is not in removing the total water above the first impervious layer but *limiting its maximum rise*; and that the country in the neighbourhood of a swamp need not be "dependent on that swamp for a considerable portion of its subsoil water supply," for the reason that it ordinarily either must imply a clay bound basin refusing to part with its surface water to the subsoil, or is itself a revelation either of the proximity of the subsoil water to the surface or of a communication therewith by a fault or depression. As to the remedy, Mr. Maloney forgets the better permeability of cultivated soil as contrasted with uncultivated, and the use *in situ* of irrigation; but granting the full value of his suggestion of falling of the subsoil water table in time as an effect of withdrawal, the proposal of "reversed wells" in swamps assumes that the water, partly surface and partly interstitial, of the upper soil of the mixed organic and inorganic structure of swamps, is at a different level to that of the subsoil water. This need by no means be the case; from the first impervious layer supporting the subsoil water to the pool on the surface of the swamp, the interstices of the soil may be filled with water. Mr. Maloney in condemning drainage ignores the fact that both the experiments of the Agricultural Department at Pusa and Madras, point to a great future in combining subsoil drainage with irrigation in securing soil aeration essential to vigorous plant life. Mr. Maloney judiciously does not furnish any data as to the cost of a "reserved well" scheme that would have any real influence upon subsoil water contents. Whilst it is quite possible that the lowering of the subsoil water table in the Aligarh and Muttra districts was due to irrigation by wells (in spite of the water being employed within the area whence derived) it is certain that his theory is not applicable, as the title of his article implies, to the Gangetic plain as a whole, the mass of subsoil water in which must be largely due to substreams of rivers, hidden by alluvial deposits, bearing water from distant points. Doctrines such as those advanced by Mr. Maloney seem to the writer to be in the interests of neither agriculture nor malaria prevention.

The Waterproofing of Canals.

Percolation from canals intended for irrigation purposes not only implies enormous waste of useful water for irrigation but has long been recognized as a fruitful cause of waterlogging of soil, and its attendant favouring of mosquito propagation. "Indian Engineering" [September 11th, 1915] reports a discussion of this subject at the Punjab Public Works Department Congress of 1915, when Mr. F. A. Curry drew attention to certain experiments twelve years back by Mr. R. J. Kennedy, C.I.E. That officer held "that the lining of

channels to prevent loss of water was within the range of practical politics, though the best form of lining for India had to be determined. He was further of opinion that action should first be taken with the water-courses and smaller distributaries, and he produced calculations based on his own observations to show that a greater saving could be effected by a given expenditure, if the outlay were incurred in a number of small channels rather than in the main channels." The Irrigation Commission of 1903 agreed with Mr. KENNEDY, but were inclined to the belief that attention "should be first directed to those schemes of government channels in which the loss was known to be very great, and where waterlogging was most pronounced." They advised experiments accordingly, which have not apparently been undertaken, until Mr. CURRY very fortunately, in the interests of both irrigation revenue and malaria prevention, devised a series of trials of materials which he described in his paper. One can only hope, with "Indian Engineering," that the subject will attract the attention of the Punjab Government and be worked out fully.

ARTESIAN WELLS AS SUPPLEMENTS OF CANAL SUPPLIES.

In the course of work on the Sirkind Canal, it was found that the foundation of a super-passage, sunk 6 feet below the canal bed, for flood water was seriously interfered with by strong springs. To relieve pressure from these, bored wells were sunk; with the result that the springs were found to be under a pressure giving a level "not only higher than the full level of the canal but higher than the river at the canal offtake 7½ miles up stream. RAI BAHADUR BAIJ NATH, Executive Engineer in charge, decided to attempt the use of this flow to supplement the canal water.* He sunk one hundred pipes at 200 feet intervals along the canal, or fifty to a mile. At an expenditure of Rs. 12,500 he thus secured additional water of the value for irrigation purposes of Rs. 13,500." The same officer (on instruction to attempt to supplement the water from wells in the Hoshiapore District) has advised that this can be secured "by sinking pipes inside existing wells to lower water bearing strata which exist at no great depths."

The writer refers to Rai Baij Nath's work as a further commentary upon Mr. MALONEY's paper quoted in a preceding note, in that he believes that the latter officer would probably have, in sinking existing wells to deeper strata, a sounder way of securing irrigation water than attempting methods favouring the waterlogging of soil. Rai Baij Nath's experience also points to the possibility of water now lost in the soil by percolation being to some extent utilized, pending the development of the water proofing of canals and channels, by lifting to canals subsoil water along their course by means of tube wells actuated by electricity (where such power production is feasible) as is now pursued near Amritsar. Where intermittent duty is aimed at, the writer suggests it is probable that electricity production, on certain canals, without the aid of extraneous hydraulic power, would not be a hopeless problem if water discharged for irrigation were used.

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*Indian Engineering, 1915. August 7.

Water Waste Prevention.

Mr. Madeley, the Special Engineer in charge of the recent improvements and extension of water supply and sewerage systems in the Madras City, has recently written an article in the "Local Self-Government Gazette" of Madras, which has the virtue of condensing in a few paragraphs useful information on the subjects of water waste prevention. This has been translated in the vernacular by order of the Madras Government (1200 M., 6th August 1915), and distributed free to District Municipal Councils and ratepayers. The following are extracts therefrom :—

"Metering every water service and charging for the water used is an excellent way of determining and checking waste. . . . .

"This system has been adopted to a considerable extent in America. In large wealthy cities, where the consumption per head is high, it is perhaps the most economical way of limiting waste. It has the further advantage of providing the most equitable basis of charging for water, as each householder pays for the actual quantity consumed in the house.

"The weak point of the system is that it takes no cognizance of leakage in the mains ; but used in combination with the waste water meter system described below, it forms the most efficient known method of checking leakage and waste. . . .

"In estimating the amount of this expenditure we may take the average cost of a meter, including meter pit and fixing, at Rs. 100, and assuming 40,000 connections to be made eventually in a town of the size of Madras :—

	Rs.
Capital cost—	
Then the first cost would be 40,000 meters at Rs.100	40,00,000
Annual expenditure—	
Staff, materials, and replacing worn parts of meters, 40,000 meters at Rs.3	1,20,000
Interest on Capital. Rs.40,00 000 at 4 per cent.	1,60,000
Depreciation at 15 per cent.	6,00,000
Total ..	8,80,000

"Under the house service regulations recently passed by the Corporation of Madras, meters will be used only for those houses where a "first-class" service is required. In such cases the householders will bear the cost both of installing and of maintaining the meters, so that no burden will be thrown on the general tax-payer.

"House-to-house inspection has often been found very effective in reducing the waste of water. . . .

"Another fault of the method is that, while a reduction is effected in the waste from cisterns, taps and other fittings inside the house, yet it fails to discover the invisible underground leakage, which occurs in the mains, house pipes and connections.

"For these reasons house-to-house inspection alone is not sufficient in Indian cities, but it is a very useful auxiliary. . . . .

"Where the whole system has failed, the taking up and replacing of all pipes and fittings may be adopted with advantage, and will produce excellent results. . . .

"But the cost of this method is very great, and in cities where most of the pipes are believed to be watertight and serviceable, there would be no justification for incurring the great expense. . . .

"Again, though an excellent system would be secured with few sources of leakage, yet some plan of maintenance would still have to be devised to ensure the ready detection and remedy of losses due to waste, and to such leaks as would develop in course of time.

"In the waste-water meter system the city is divided into districts, and the mains are so arranged that, by closing a few valves, the whole of the

water required for any district is supplied through a pipe on which is placed a waste-water meter. This form of meter records continuously the flow of water through it on a diagram attached to a drum which is caused to rotate by means of a clock.

"The flow which takes place between midnight and 4 a.m. will be mostly leakage and waste.

"The diagrams for the whole city are brought in daily or weekly, as may be thought best, and from them the Engineer is able to see at a glance in which districts water is most wasted, and on these districts is concentrated the energy of the staff. . . . .

"In order to localise the waste, an Inspector conducts a night inspection. Beginning about midnight, he sounds and closes all stop cocks on the connections, closing the sluice valves on each branch as soon as all the stop-cocks on that branch have been shut down. The time is carefully noted in every case, and, by referring to the recorder diagram, the effect of closing each valve can be ascertained, and the points of leakage located within narrow limits; their positions are determined more exactly by means of stethoscopes.

"The premises where excess water is being used are inspected during the next few days, and notice is served to remedy any defects which may be found. If the leakage has been traced to the main or house connection, the road is opened up, and the fault repaired. . . . .

"The waste-water meter system is very generally used throughout England.

"The effect in Calcutta has been to reduce the consumption under constant supply from 22,000,000 to 17,000,000 gallons per day, a saving of 5,000,000 gallons per day or nearly 23 per cent.

"The result of adopting the system in Bombay is shown by the following extract taken from the Administration Report of the Municipal Commissioner for 1905:—

"It having been ascertained beyond doubt that a very large quantity of water was leaking from the water mains and service pipes, it was deemed expedient to increase the staff engaged in this work and form a special branch whose duties would consist of the detection of waste and the location of defects upon the water mains, service pipes, fittings, etc. Since the 1st of September, 1904, this system has been followed with considerable success. Many underground leaks and defects, some of a very extensive nature, having been brought to light and repaired, consequently the supply and pressure in several districts has been much improved."

"As an example of the application of waste-water meter system, it may be stated that in the scheme prepared for Madras, the city has been divided into 134 districts, each provided with a separate waste-water meter. In addition to the waste-water meters, the city has been divided into 13 bulk meter districts, so that, in ordinary working, when the quantity of water supplied to one of the 13 bulk meter areas is found to be excessive, the sources of waste can be traced by means of the waste-water meter.

"In conclusion, it may be stated that water is a valuable commodity, and must be treated as such to derive the full benefits from a pure water-supply. It is just as important to close every water tap as soon as sufficient water has been drawn and stop every leak, as it is to switch off the current in a house supplied with electricity, when the lights and fans are not required."

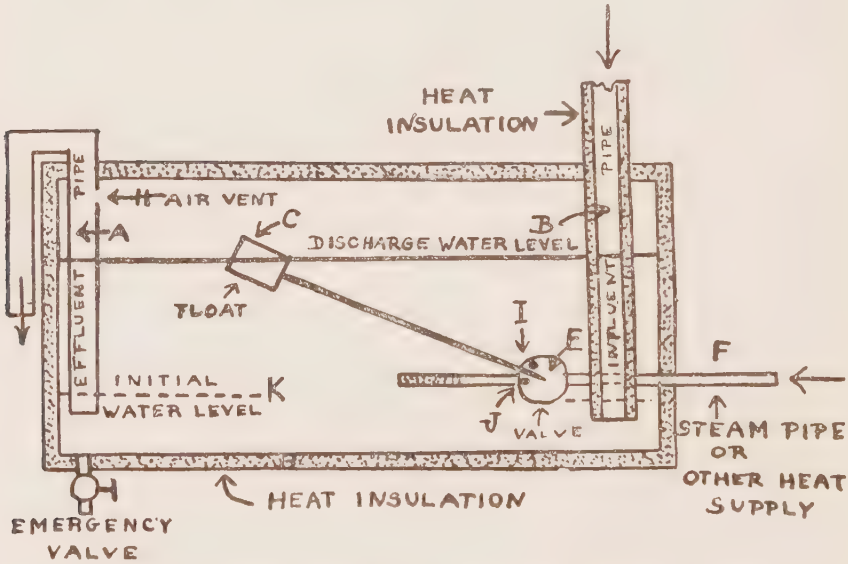
Sewage Disinfection.

At the Saigon Congress of 1913, one of the speakers pointed to the necessity of so constructing the discharge points of scuppers and latrines on board ship that a stream of filth shall not be possible on the ship's side. He stated that, in loading and unloading ships in port, more especially when the stage is reached of the hulk being well above water, men in boats alongside dealing with cargo are apt to get their hands defiled with typhoid or cholera matter, and thus become foci for infection of ports. As a result of steamers conveying much

passenger traffic on small rivers or on much used routes on lakes, where the water is employed for drinking and washing purposes, dangerous defilement is liable to occur if direct discharge of the faecal matter of crews and passengers be allowed.

In railway trains, in certain tropical countries, on long journeys faecal matter is disposed of by water flush closets so as to be deposited on the permanent way. Irrespective of contempt of aesthetic prepossessions of labourers, it is evident that, if the railway be within the watershed of public supply waterworks, a serious danger of spread of typhoid and cholera is risked.

Under such circumstances, contrivances allowing of mixing the faeces with standard quantities of lime hypochlorite might be employed, but a process that will subject the whole mass to heat and only then permit of passage of faecal matter must be of spceial value. Leslie C. Frank, Sanitary Engineer, U.S. Public Health Service, thus describes an apparatus for securing this end. It must be understood that when employed on railways the shutting offof steam, in the locomotive engine of a train prevents discharge at unreasonable points, such as within railway stations, and for this purpose certain storage room is provided in the automatic reservoirs.



Device for Sewage Disinfection in Vessels and Railway Coaches.

"The operation of this device is as follows: Assume that the initial water level in the tank is at K. The steam valve E is in its closed position and the influent pipe B is submerged below the water level; in other words, the influent pipe B is always trapped, even at the times of minimum water level in the tank. The entrance of sewage into the tank through B causes the level of the water in the tank to rise gradually and to carry the float upward with it. The float arm, however, is pivoted freely upon the steam-valve disk and therefore does not turn on the steam by revolving the disk until it engages the pin I; that is, until the liquid in the tank has reached a certain predetermined height, dependent upon the position of the pin I. When this height of water is reached the steam is gradually turned on. For a time the entering steam is immediately condensed and gives up its

heat to the water. The water thus becomes heated at a rate dependent upon the rate and pressure of the steam discharge. As the temperature of the water approaches the boiling point the steam ceases condensing in the water but rises through the water and collects in the chamber space above it. At about the boiling point of water, or a trifle above, the pressure develops in this upper space and gradually forces the sewage up and out through effluent pipe A.

As the liquid discharges the water level and the float descend. The steam, however, remains turned on full until the float arm engages pin J, when a slight further descent shuts off the steam. The level of liquid at which the steam is shut off and at which discharge from the tank immediately ceases may be predetermined by the position of the pin J. The small hole H is provided to enable the air in the tank to escape as the sewage enters. The relation of the size of this hole to the total cross-section areas of the steam influent openings is such that only a very small percentage of the steam entering through pipe F can escape through hole H, and therefore pressure develops in the tank practically as fast as if hole H were not present. This hole may be replaced by a simple thermovalve, which will be open below say, 80° C. and closed above that temperature, but the percentage of steam escaping through H is so low that it is doubtful whether the inclusion of such a valve is warranted."*

*U.S. Public Health Reports. 1915. Jan. 1. Vol. 30. No. 1.

LANDS AND BUILDINGS.

The Width of a First Class Road in a City.

There has been considerable discussion in Calcutta as to what should be the width of the Russa Road, which will form an important link between the city and the Tollygunge suburb. The history of the scheme as stated by "Indian Engineering" [September 18, 1915] shows that the first proposal was that there should be "an 18 feet tram track." In July, 1914, "it was resolved that the roadway be 66 feet wide, the tram track forming parts of the roadway, and that the footways on each side be 17 feet wide planted with trees. By January 1915, "it was resolved that the roadway be 54 feet wide, and there be footways on each side of 23 feet width." Professor Geddes was now consulted. He advised—

"The lay-out of the road should make provision for running tram-cars at express speed; next, that the maximum width possible of footway be arranged for—not less than 17 feet on the one mile of Russa Road widening and 20 feet on the wider extension southward; third, that central tramway standards be employed, with cars on each side; fourth, that the tram-track be of sleeper construction with grass strips, and provided with islands at the halting places."

The necessity for speed for trams is regarded as important if the suburb is to attract the commercial classes. Dealing with the subject, the Chief Engineer of the Calcutta Corporation expresses his opinion that the maximum rate for the trams should be 19½ miles per hour with stopping stations at 250 increasing to 300 and 400 yards as the population decreases. He then states:—

"Two trams measure 17 feet over all. If central standards are used 2 feet must be added, making 19 feet. It seems to be decided that if the trams are on a separate track some form of low railing is advisable which would require 2 feet more. A single side pole with the arm takes up nearly as much room as a central standard; so that if there are no span wires from the foot-paths, the tram-track, if on sleepers, will take about 21 feet. If 24 feet is regarded as the minimum width of the two roadways, the foot-paths cannot be more than 15½ feet wide."

The full width of the roadway according to the decision of January 1915 being 54 feet, the arrangements for the tram-track leaves 23 feet for the footways on each side. This size of footways, instead of 15½ which would be the size possible after following Professor Geddes' plan in other respects, the Improvement Trust concerned holds is very desirable, but the decision 54 feet is incompatible. "Indian Engineering" would combine the varying views as follows:—

"Thus with Professor Geddes's idea of what the roadway should be (and we think he is right) and the Board's idea of what footways should be (and we think they too are right) we should have had for the full width of the Russa Road a minimum of 115 feet instead of 100; and it is this *minimum* we should like to see suggested by Government, if the question has not been already closed."

General Principles of Town Planning.

The following opinions were *inter alia* expressed by the Chief Engineer of the Board of Estimate and Apportionment, New York City (Nelson P. Lewis) at the recent International Engineering Congress at San Francisco.* He states that the first step in town planning should be

*Engineering Record, 1915. Oct. 2, p. 415.

the possession of a complete topographical survey so that the full necessities and possibilities of a case can be fully recognized at the outset, especially in such important details as future lines of drainage, railways, roads, also parks, and, if there be a waterfront, the localities best suited for pleasure and commerce, respectively. He considers a contour map or model of the site helpful in deciding such details.

In the arrangements of streets, he warns against steep gradients and the adoption of stereotyped straight lines.

In the matter of tree planting, he states as follows :—

"The importance of trees in a city cannot be over-estimated. Their position should therefore be one of the street details to receive careful study. The practice of placing them immediately back of the curb is quite general, and where buildings are placed on the street line it may be necessary to do so in order to give them space of growth. If they are placed between the sidewalk and the building line, however, the street acquires an added dignity and appears to be wider than where the trees are placed along the curb."

He insists upon the necessity for effective legislation to prevent the sacrifice of public to private interests, and to secure consistent schemes of development and improvement, by affording guarantees that when once a design is inaugurated giving a special character to a district, it shall not be invaded "by industries, uses or occupations inconsistent with that character"; "the prohibition of the erection of structures either permanent or temporary which will offend the eye, or of anything destructive of amenity" is urged.

In financing town planning schemes, he presses attention to the question whether an improvement will be of general benefit to the inhabitants of a town (such as the possession of buildings in localities for public activities and amusements) or a special benefit merely to a portion, so that the cost of improvements "to be assumed by a town will be less in proportion to the amount of special benefit resulting to the particular locality.

Unhealthy Building Areas.

In New South Wales under Section 55 of the Public Health Act—

"Land is usually proclaimed unfit for building purposes, either because it is low-lying and subject to inundation by tidal or storm water, or rendered unhealthy by swampy conditions due to accumulation of drainage, or has been used for the tipping of offensive garbage. As soon as the land is proclaimed, a notice is served on each owner, and the conditions considered necessary to render the land fit for building purposes are specified."

There would apparently be no difficulty in working this Section were it not that "unfortunately there exists no obligation on the part of the owner to notify the Department of his intentions to build on the land." In consequence, the law is much evaded by owners selling sub-divisions of badly drained portions, which are at once utilized by the poorer classes.

Obviously, to render the Section of real utility, it is necessary to secure a ruling that no building shall be erected without consent of the Local Authorities in the area concerned, and giving power to cause prompt demolition of a building erected without consent.

The Destruction of Prickly Pear.

This subject evidently is not without importance in Queensland, where a travelling Commission (Harvey Johnston, M.A. and Henry Tryon) have dealt with it since November 1912. They have recommended that systematic experiments should be undertaken with the plant, such as to make alcohol, paper and fodder. They also remark that "the wild cochineal used have proved very destructive to *Opuntia monocantha*."

A discovery of a method of utilizing commercially the masses of vegetable organic matter the chief fault of which is that it is defended by thorns, or, failing that, of securing its cheap destruction, would be of great sanitary importance to very large areas in India. The immediate surroundings of village sites in the Deccan and South of India are frequently so overrun by masses of prickly pear that much valuable ground is rendered useless for cultivation; perflation of the inhabited area is prevented, and shelter for snakes, rats, dead animals and human faeces is afforded.

To remove the prickly pear by manual labour is a slow and expensive process and, if not so conducted as to destroy the roots, is of no utility. The plant has been used with much success as manure by securing its decomposition after cutting in deep pits; but the thorns so resist destruction by natural means that they become a danger on manured ground to the cultivator and his cattle. In famine the fruit is largely used by the people for food. The prickly pear has also been used as fodder after the removal of the thorns but, as the process can rarely be absolutely effective (although its successful employment has been and must be possible in careful hands), the writer has received woeful accounts of deaths of cattle due to undigested fibre causing intestinal irritation, plus thorns found on post-mortem examination in the abdominal organs, whither they had wandered after the manner of needles.

In one matter, however, he has seen prickly pear used with advantage. A cement plastered wall will not take paint evenly till it has set perhaps fully six months and, in hospitals or sanitary buildings, it is often not desirable to wait for this period as a penalty for having used cement plaster. If the plant be boiled, a tenacious fluid is obtained which, if painted over a reasonably mature cement wall as a preparatory coat, will secure the desired result *much better* than size or silicate preparations. This little fact, if properly pursued commercially, might prove of economic advantage.

In the Canary Islands, the prickly pear before the introduction of aniline dyes was a plant of value, as it supported and probably still does the cochineal insect. Knowing this, the writer in 1895 advocated, as does now the Queensland Commission, the use of the cochineal insect to destroy prickly pear and, incidentally, to secure an industry that would then, and especially at the present time, be valuable. But he found that the same ground had been trodden in 1862 by others, without permanent success. He then suggested the use of certain parasitic growths, which appeared to him to cause death to the plant. The question was referred by the Madras Government to Sir George Watt (Economic Reporter to the Government of India)

and Sir Alfred BOURNE (Professor of Biology, Madras University) with the result of extracting much interesting information from these experts as to the difference between the wild and the commercial varieties of cochineal insect, and the apparently important preference of the latter for the red flowered opuntia (*O. cochinellifera*) as against the yellow flowered (*O. dillenii*). As to the parasitic method of destruction all that occurred was that the plant disappeared down to the roots but was again able to flourish. From Australia also about this period came a method, which was patented, of injecting the plant with a preparation, understood to be of an arsenical nature; but here without special treatment the roots also survived. So that a subject that is of much sanitary, and might be of commercial, importance both in India and Australia is still open for research. The Indian Research Fund might find in it a useful field for employment of the Rs.50,000 returned by certain Bengal District Boards, which had been allotted by it for experimental "jungle clearing."

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Reprints and Pamphlets received :—

BAYMA (T.). A Adrenalina na Dysenteria Amoebica.—*Ann. Paulistas de Med. e Cirurg.*, 1915. [Also in French.]

BAYMA (T.). A Typho-Vaccina em S. Paulo (Segunda Nota).—*Ann. Paulistas de Med. e Cirurg.*, 1915.

BISHOPP (F. C.). Fleas as Pests to Man and Animals, with Suggestions for their Control.—*U.S. Dept. Agric. Farmers' Bull.*, 1915.

BISHOPP (F. C.) & LAAKE (E. W.). A Preliminary Statement regarding Wool Maggots of Sheep in the United States.—*Jl. Econom. Entomol.*, 1915.

CAWSTON (F. G.). Schistosomiasis in Natal.—*Jl. Trop. Med. & Hyg.*, 1915.

LAVERAN (A.). Nouvelle contribution à l'étude des infections expérimentales de la souris par la *Leishmania tropica* ; un cas d'infection de la gerbille.—*Bull. Soc. Path. Exot.*, 1915.

LOW (G. C.). The Treatment of Amoebic Dysentery.—*Brit. Med. Jl.*, 1915.

LOW (G. C.). A Case of Oriental Sore treated by Antimonium Tartaratum (Tartar Emetic) locally.—*Jl. Trop. Med. & Hyg.*, 1915.

DYER (I.). The Medical Career.—*New Orleans Med. & Surg. Jl.*, 1915.

DYER (I.). Skin Cancer and its Treatment.—*Interstate Med. Jl.*, 1915.

Note.—On direct application (not through agents or booksellers) any of the foregoing reprints or pamphlets will be sent on loan to any part of the world, the Bureau paying outward postage.

Book received.

WATSON (Malcolm) [M.D., C.M., D.P.H.] Rural Sanitation in the Tropics ; Being Notes and Observations in the Malay Archipelago, Panama and Other Lands.—xvi+320 pp. Demy 8vo. With illustrations. 1915. London : John Murray, Albemarle Street, W. [Price 12*s.* net.]

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LIST OF REFERENCES.

[Continued from BULLETIN, Vol. 6, pp. i–xxviii.]

For the benefit of recipients of the Bulletin, who wish to make a Card Catalogue, or to preserve a consecutive record of the references on any subject, galley proofs [' *Korrekturbogen* ' ; ' *Première* '] of the **Quarterly Lists of References** (printed on one side of the page) can be supplied at the subscription price of **Two Shillings** per annum. They are obtainable from the beginning of 1914 onwards. Application should be made direct to the Bureau.

AMOEBIASIS (including Entamoebic Dysentery and Liver Abscess).

ALLAN (W.). Emetine in the Treatment of Amoebic Dysentery.—*Internat. Clin.*, 1915. Vol. 1. 25 ser. pp. 6–17.

[A useful compendium of information on emetin, embodying the experience of various workers with regard to dosage, mode of administration, the question of relapses and carriers, etc. Not suitable for detailed reference.]

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LOEHLEIN (M.). Ueber Amöbenenteritis und Leberabszesse.—*Verhandl. d. deutsch. path. Gesellsch.*, 1914. Vol. 17. pp. 261–265. With 1 plate. [*Index Medicus.*]

McCarty (M. A.). A Study of Two Cases of Amebic Dysentery.—*Wisconsin M. J.*, 1914–15. Vol. 13. pp. 404–409. [*Index Medicus.*]

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[The contents of this paper are sufficiently denoted by the title.]

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Schwalb (Johannes). Beitrag zur Behandlung der Amöbendysenterie mit intravenösen Emetininjektionen.—*Arch. f. Schiffs- u. Trop.-Hyg.*, 1915. Mar. Vol. 19. No. 5, pp. 147–148.

See also **Dysentery (unclassed).**

BERIBERI and POLYNEURITIS AVIUM.

Albert (J.). Estudios etiologicos y clinicos acerca del beriberi infantil.—*Mem. y comunic. de la Asamblea reg. de med. y farm. de Filipinas.* 1914. Vol. 2. pp. 555–575. With 2 plates. [*Index Medicus.*]

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——. The Treatment of Infantile Beriberi with the Extract of Tiqui-Tiqui.—*Philippine Jl. Sci.*, Sect. B., Trop. Med., 1915. Jan. Vol. 10. No. 1, pp. 81–85.

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SALÓM (C. E.). Prehemoglobinuria febril. (Apreciaciones Clinicas)—*Gaceta Med. de Caracas*, 1915. Sept. 15. Vol. 22. No 17, pp. 134–136.

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[A short account of the disease under the following headings.—(1) Cholera in general; its epidemics and some description of the *V. cholerae.* (2) An account of the epidemic in Cracow and its surroundings during the latter part of 1914. (3) Bacteriological methods. (4) Prophylactic inoculation. Nothing of particular interest.]

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DOPTER (C.). La prévention du choléra par les vaccinations anti-cholériques; les maladies infectieuses dans l'armée.—*Jl. de Méd. et Chir. Prat.*, 1915. Vol. 86. pp. 169–173. [*Index Medicus.*]

——. Prophylaxie du Cholera dans les Armées en Campagne.—*Paris Méd.*, 1915. July 24. Vol. 5. Nos. 11–12, pp. 197–200.

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JOHNSTONE (R. W.). Report to the Local Government Board on the Progress and Diffusion of—I. Plague. II. Cholera. III. Yellow Fever, throughout the World during the Year 1913.—*Rep. to Local Govt. Brd. on Pub. Health & Med. Subjects.* vi + 110 pp. 1915. London : Printed under the Authority of H.M Stationery Office.

LANGE (Carl). Ein neuer Nährboden für die Choleradiagnose.—*Deut. Med. Woch.*, 1915. Sept. 16. Vol. 41. No. 38, pp. 1119–1120.

von LINGELSHEIM (W.). Zur Frage der Verwendbarkeit alkalischer Blutnährböden für die praktische Choleradiagnose.—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. May 20. Vol. 76. No. 2–3, pp. 108–110.

LOEWY (Otto). Bilden Choleravibrionen Hämotoxine.—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. Jan. 15. Vol. 75. No. 4, pp. 319–329.

MARCOVICI (Eugen) & SCHMITT (Max). Zur Therapie der Cholera asiatica Vorläufige Mitteilung.—*Wien. Klin. Woch.*, 1915. Aug. 19. Vol. 28. No. 33, pp. 894–896.

MARKL (Jaromir Gottlieb). Eine neue Vorrichtung für rasches und billiges Arbeiten bei Massenuntersuchungen auf Cholera.—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. June 28. Vol. 76. No. 4, pp. 305–306. With 1 text fig.

[The use of bell shaped aluminium caps in place of cotton wool plugs, for the peptone enrichment test tubes in the case of great numbers of suspected cholera stools, is suggested as a means of saving both cotton wool and time.]

MUNSON (E. L.). Cholera Carriers in Relation to Cholera Control.—*Philippine Jl. Sci.*, Sect. B., Trop. Med., 1915. Jan. Vol. 10. No. 1, pp. 1–9.

Olsson (P. G.). Zur Variation des Choleravirus.—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. May 14. Vol. 76. No. 1, pp. 23–37.

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Ottolenghi (D.). Per la preparazione del vaccino anticolerico.—*Policlinico*, Sez. Prat., 1915. Aug. 8. Vol. 22. No. 32, pp. 1057–1058.

von Rembold. Ueber den Keimgehalt von Cholera und Typhusimpstoffen.—*München. Med. Woch.*, 1915. July 27. Vol. 62. No. 30, pp. 1005–1006.

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——. Practical Experience with some Enriching Media recommended for Bacteriological Diagnosis of Asiatic Cholera.—*Philippine Jl. Sci.*, Sect. B., Trop. Med., 1915. Mar. Vol. 10. No. 2, pp. 127–144.

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Stein. Cholerabazillenträger und ihre epidemiologische Bedeutung.—*Wien. Klin. Woch.*, 1915. July 8. Vol. 28. No. 27, pp. 737–739.

Stoerk (E.). Zur Therapie der Cholera asiatica.—*Zentralbl. f. d. ges. Therap.*, 1915. Vol. 33. pp. 1–3. [*Index Medicus.*]

Suessmann (Ph. O.). Die Verwendung von Drigalski-Schalen zur Gewinnung von Typhus- und Cholera-Impstoff mit Hilfe eines einfachen Apparates.—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. June 28. Vol. 76. No. 4, pp. 288–294. With 3 figs.

Voje (J. H.). Two Interesting Letters concerning the Causes of Cholera, as understood in 1849.—*Wisconsin M. J.*, 1914–15. Vol. 13. pp. 365–367. [*Index Medicus.*]

Weisskopf (A.). Ueber eine Choleraepidemie in M. im Dezember 1914 bis Januar 1915.—*Wien. Klin. Woch.*, 1915. Apr. 8. Vol. 28. No. 14, pp. 385–386. With 1 chart.

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Whyte (G. Duncan). The Treatment of Cholera by Hypertonic Saline Solutions during an Epidemic at Swatow, South China.—*Brit. Med. Jl.*, 1915. Sept. 18. pp. 425–429. With 2 charts.

DYSENTERY (Bacillary and Unclassed).

(A.) Bacillary.

Ascoli (Alberto). Diffusione profilassi della dissenteria bacillare. Conferenza tenuta all'Associazione Sanitaria Milanese il 25 marzo 1915.—*Attualità-Medica*, 1915. July. Vol. 4. No. 7, pp. 413–436. With 10 diagrams.

[Comprehensive survey of bacillary dysentery in its clinical, bacteriological, epidemiological, geographical and demographical aspects. Not suitable for detailed reference.]

TEN BROECK (Carl). A Note on the Invasion of the Bodies of Infants by *B. dysenteriae.*—*Boston Med. & Surg. Jl.*, 1915. Aug. 19. Vol. 173. No. 8, pp. 284–286.

—— & NORBURY (Frank Garm). The Presence of *B. dysenteriae, B. proteus vulgaris, Bact. Welchii*, and Morgan's Bacillus No. 1 in the Stools of Cases of Infectious Diarrhoea.—*Boston Med. & Surg. Jl.*, 1915. Aug. 19. Vol. 173. No. 8, pp. 280–284.

BRYSON (J. G.). Clinical Aspects of Bacillary Dysentery in Texas.—*Texas State Jl. Med.*, 1915. May. Vol. 11. No. 1, pp. 36–38.

CARVER (A. E.). The Importation of Bacillary Dysentery.—*Brit. Med. Jl.*, 1915. Oct. 9. p. 532.

[The writer discusses the possibility of bacillary dysentery being introduced into the civilian population at home by convalescent troops. As he says, the disease is not notifiable and "there seems to be but little general recognition of the established fact that it is capable of assuming epidemic aggressiveness even in this country."]

DOPTER. Prophylaxie de la Dysenterie Bacillaire.—*Paris Méd.*, 1915. July 24. Vol. 5. Nos. 11–12, pp. 203–206.

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NOC (F.). Vaccinothérapie de la Dysenterie bacillaire et des Diarrhées chroniques.—*Bull. Soc. Med. Chirurg. Indochine*, 1915. May. Vol. 6. No. 6. 6 pp.

PICK (L.) & BLUMENTHAL (F.). Zum Thema der Erreger der Bazillenruhr.—*Zeitschr. f. ärztl. Fortbild.*, 1915. Vol. 12. No. 6, pp. 177–178.

[Brief note containing data regarding the types of dysentery bacilli met with in the sphere of operations of the bacteriological station (Berlin) to which the authors are attached. They have isolated 14 strains from sporadic cases of dysentery 3 *Shiga*, 2 *Flexner*, and 9 *Y.*]

SOLDIN (Max). Widalsche Typhusreaktion bei Y-Ruhrkranken.—*Deut. Med. Woch.*, 1915. July 15. Vol. 41. No. 29, pp. 858–860.

SONNE (Carl). Ueber die Bakteriologie der giftarmen Dysenteriebacillen (Paradysenteriebacillen).—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. Feb. 15. Vol. 75. No. 5–6, pp. 408–456.

——. Die diagnostische Bedeutung der Agglutination der giftarmen Dysenteriebacillen (Paradysenteriebacillen) in Patientenseris.—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. May 14. Vol. 76. No. 1, pp. 65–87.

(B.) Unclassed.

ALTER. Ruhrähnliche Darmerkrankungen.—*Deut. Med. Woch.*, 1915. Vol. 41. No. 5, pp. 136–137.

Beneke. Ruhr mit multiplen Perforationen der Darmwand ohne Peritonitis.—*München. Med. Woch.*, 1915. Vol. 62. No. 5, pp. 158–159.

Busson (Bruno). Immunisierungsversuche gegen Dysenterie mit Toxin-Antitoxingemischen.—*Wien. Klin. Woch.*, 1915. Aug. 12. Vol. 28. No. 32, pp. 853–856.

Chalmers (Albert J.) & Papatheodorou (Dimitri). The Administration of Emetine during Pregnancy and Menstruation.—*Jl. Trop. Med. & Hyg.*, 1915. July 15. Vol. 18. No. 14, pp. 159–160.

Craig (T. E.). Acute Dysentery in the Adult.—*Kentucky Med. Jl.*, 1915. Sept. 1. Vol. 13. No. 10, pp. 465–468.

[Clinical lecture dealing with diagnosis, symptomatology, and treatment of bacillary dysentery. Contains nothing necessitating reference.]

Dopter (C.). The Diagnosis and Treatment of Different Varieties of Dysentery.—*Monde Med.* [*Engl. Ed.*] *Par.*, 1915. Vol. 25. pp. 97–105. [*Index Medicus.*]

Ghigoff (B.). Ueber die Behandlung der Dysenterie und Cholera mit Natrium sulfuricum.—*Wien. Klin. Woch.*, 1915. Aug. 26. Vol. 28. No. 34, pp. 922–924.

Kruse (W.). Die Ruhr in Krieg und Frieden.—*Deut. Med. Woch.*, 1915. Sept. 2. Vol. 41. No. 36, pp. 1057–1058.

du Mont. Behandlung von Ruhr und ruhrähnlichen Darmkatarrhen.—*Deut. Med. Woch.*, 1915. Sept. 9. Vol. 41. No. 37, p. 1101.

Noc (F.). Sur le diagnostic des dysenteries et des diarrhées d'Indochine. Valeur du sérodiagnostic dans les diarrhées chroniques.—*Bull. Soc. Med. Chirurg. Indochine*, 1915. May. Vol. 6. No. 6. 5 pp.

Kesava Pai (M.). An Investigation into the Bacteriology of Dysentery in the Madras Lunatic Asylum.—*Indian Jl. Med. Research*, 1915. July. Vol. 3. No. 1, pp. 149–165.

Remlinger (P.) & Dumas (J.). Insuffisance surrénale au cours de la dysenterie.—*C. R. Soc. Biol.*, 1915. Aug. Vol. 78. No. 14, pp. 433–435.

Riley (E. T.). Dysentery, or Ileo-Colitis.—*Kentucky Med. Jl.*, 1915. Sept. 1. Vol. 13. No. 10, pp. 447–448.

[Brief lecture on the symptoms and treatment of dysentery or ileocolitis as it is met with in children. Bacteriological or microscopical examination of the motions to determine the type of dysentery is not referred to, but it appears that the author employs ipecacuanha in large doses (5–30 grs.) in milk.]

Roubitschek & Laufberger. Zur Behandlung der Dysenterie-Rekonvaleszenten.—*Therap. Monatshefte*, 1915. June. Vol. 29. No. 6, pp. 327–330.

Sacquépée, Burnet & Weissenbach. Recherches sur les Diarrhées et la Dysenterie des Armées en Campagne.—*Paris Méd.*, 1915. July 24. Vol. 5. Nos. 11–12, pp. 200–203.

Singer (G.). Ueber Dysenterie.—*Klin. therap. Wochenschr.*, 1915. Vol. 22. pp. 1–8. [*Index Medicus.*]

——. Ueber Ruhr (Dysenterie).—*Allg. Wien med. Ztg.*, 1915. Vol. 60. pp. 19, 25, 29, 35. [*Index Medicus.*]

STRAUSS (H.). Zur Aetiologie der Dysenterie und dysenterieähnlicher Erkrankungen.—*Arch. f. Verdauungskr.*, 1915. Feb. 15. Vol. 21. No. 1, pp. 16–22.

——. Ueber Serodiagnostik larvierter Fälle von chronischer Dysenterie.—*Deut. Med. Woch.*, 1915. Sept. 2. Vol. 41. No. 36, pp. 1059–1060.

FEVERS (Unclassed) and DENGUE.

MURRAY (W. A.). Low Fever. [Correspondence.]—*Jl. Trop. Med. & Hyg.*, 1915. Sept. 1. Vol. 18. No. 17, p. 204.

NOC & GAUTRON. Deux cas de fièvre indéterminée rappelant le pseudo-typhus de Delhi observés à Saigon.—*Bull. Soc. Med. Chirurg. Indochine*, 1915. Feb. Vol. 6. No. 3. 8 pp.

OLIVIER (P. H.). Over een polyglandulair syndroom bij van der Scheer's koorts (tegelijk een bydrage tot de kliniek der v/d koorts).—*Geneesk. Tijdscher. v. Ned. Ind.*, 1915. Vol. 55. No. 4, pp. 385–392.

SARRAILHÉ (A.), ARMAND-DELILLE (P.) & RICHET (Ch.) fils. Note sur l'épidémie de fièvre de trois jours (Dengue d'Orient) observée aux Dardanelles sur les troupes du Corps expéditionnaire d'Orient.—*Bull. Acad. Méd.*, 1915. Sept. 21. Vol. 74. Ann. 79. (3e ser.) No. 38, pp. 317–322.

STATHAM (J. C. B.). Report on a Series of 800 Medical Pyrexias investigated on Behalf of the Yellow Fever (West Africa) Commission at Sierra Leone, from May to September, 1913, with the Inclusion of a Further 300 Cases investigated before the Formation of that Commission.—*Yellow Fever Commission Reports (W. Africa). Yellow Fever Bureau Bull.* Suppl. Vol. 2. 1915. Aug. 18. pp. 353–387.

WILL (John H.). Case of Dengue Fever (Relapse).—*New Zealand Med. Jl.*, 1915. Aug. Vol. 14. No. 62, pp. 181–182.

[A fever of doubtful character contracted at Samoa is described. The chief symptoms of the initial attack were fever, headache, and pains in the neck. This was diagnosed in the hospital at Samoa as Dengue. When seen by the author, the skin of the nose was red and tender, the eyes were congested, and the patient suffered from headache and pains in the neck, but these were not so severe as in the previous attack.]

HEAT STROKE.

BRUNO (G.). Quattro casi di colpo di calore sulla R. nave "S. Caboto."—*Ann. Med. Nav. e Colon.*, 1915. June. Anno 21. Vol. 1. No. 6, pp. 654–655.

HANSON (George C.). Chloroform in the Treatment of Insolation.—*Jl. Amer. Med. Assoc.*, 1915. Oct. 9. Vol. 65. No. 15, p. 1277.

HELMINTHIASIS.

TREMATODES.

FISCHER (Walther). Ueber die Eier von *Clonorchis sinensis*.—*Arch. f. Schiffs- u. Trop.-Hyg.*, 1915. July. Vol. 19. No. 13, pp. 358–361.

KOBAYASHI (Harujiro). On the Life-History and Morphology of *Clonorchis sinensis*.—*Cent. f. Bakt.*, 1. Abt. Orig. 1915. Jan. 13. Vol. 75. No. 4, pp. 299–318. With 4 plates.

Schistosomiasis.

MILLER (J. W.). Ueber die brasilianische Schistosomiasis (Bilharziosis Mansoni).—*Verhandl. d. Deut. Path. Gesellsch.*, 1914. Vol. 17. pp. 265–273. [*Index Medicus.*]

MINET (H.). Deux Cas de Bilharziose Vésicale provenant de l'Afrique Septentrionale française.—*Ann. d. Maladies Vén.*, 1915. July. Vol. 10. No. 7, pp. 385–396. With 1 coloured plate.

MIYAIRI (K.) & SUZUKI (M.). Der Zwischenwirt des *Schistosomum japonicum* Katsurada.—*Mitt. a. d. med. Fak. d. k. Univ. Kyushu Fukuoka.* 1914. Vol. 1. pp. 187–197. With 2 plates.

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[Consists of a lecture on typhus delivered by the author in Berlin; nothing original. Two figures are given showing examples of a diffused type of exanthem scattered over the body.]

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[A good general account of the disease with notes on the symptoms, pathological anatomy, etiology, treatment and prophylaxis. Nothing original.]

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